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WAR MACHINE

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The Alvis Scorpion in Action

Soviet Reconnaissance Battalion

US Light Tank Developments

Armed Forces of the World: Israeli Defence Force/Air Force (Part 1)

A fully illustrated guide to Modern Light Tanks and Reconnaissance Vehicles

WAR MACHINE

Volume 2 **Issue 19**

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WAR MACHINE

Forthcoming issues feature: Modern Automatic Weapons
Fighter-bombers of World War II
Fighter Aircraft of World War I
Carrierborne Aircraft

Modern Light Tanks and Reconnaissance Vehicles

Modern reconnaissance vehicles no longer have a clear-cut role to themselves as many of their traditional cavalry tasks, especially the gathering of information, are being carried out by newer means. As a result, differing theories on the employment of light armour in combat today have led to a bewildering variety of vehicle types and armament.

The original role of armoured cars in World War I was the gathering of information on the strength, position and movement of enemy forces, and in such a role armoured cars would normally act ahead and on the flanks of the main forces. This was satisfactory in a fluid battle situation, but once the lines of the opposing forces had become established there was often little the armoured car could do as it lacked the firepower, armour protection and mobility of the tank. In the years following World War II some NATO countries (for example the UK and France) have continued the development of armoured cars or developed light tracked vehicles that have much improved off-the-road performance when compared with their wheeled counterparts (a good example is the British Alvis Scorpion), while other countries see little need for armoured cars to carry out the reconaissance role, and so employ tanks for this purpose.

Today there are many other means of carrying out the reconnaissance role, such as aircraft, helicopters and more recently RPVs. Some of these can send back real-time information about the whole battlefield, whereas the armoured car or other surface reconnaissance vehicle is limited to a mere portion of the battlefield.

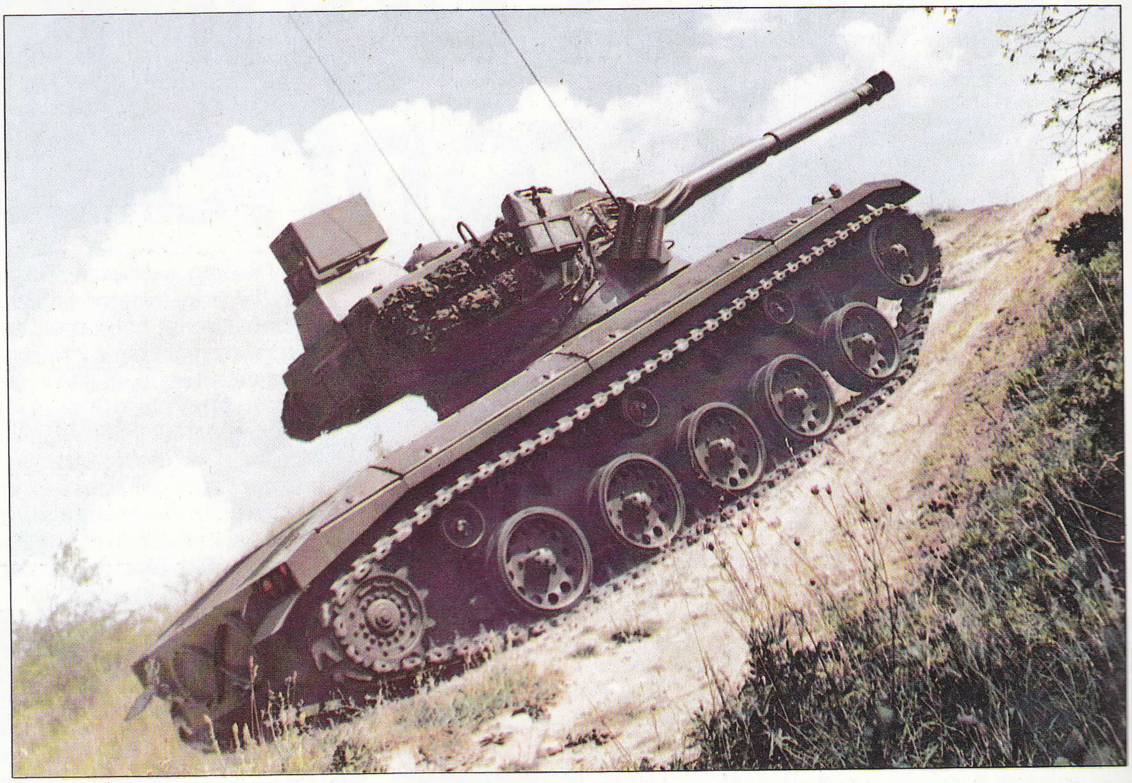
It is also apparent that countries often place a different emphasis on their concept of reconnaissance vehicles. The West German 8×8 Spähpanzer Luchs has excellent cross-country mobility, is fully amphibious, has a high road speed and is possessed of exceptional operational range, but is armed with only a 20-mm cannon. The French 6×6 AMX-10RC on the other hand is fully amphibious, has a good road speed and is armed with a 105-mm (4.13-in) gun. There is a school of thought that believes that to give a reconnaissance vehicle too heavy an armament may tempt the crew to engage the enemy rather than report the same enemy's position back to the next link in the chain of command.

In many African, South American and Far Eastern countries the armoured car is often the main offensive force of the army and is also heavily engaged in internal security operations. For this reason there has been a trend in recent years to put the heaviest possible gun onto the chassis of the armoured car.

Scorpion reconnaissance vehicle on patrol in the Middle East. Over 3000 of these vehicles and variants have been sold to some 16 countries. It has exceptional cross-country mobility and is armed with a potent ROF Nottingham 76-mm (3-in) gun.

AUSTRIA

SK-105 Light Tank/Tank Destroyer



The SK-105 light tank/tank destroyer climbs an incline, showing the French laser rangefinder on the turret roof at the rear with an infra-red/white light searchlight mounted above. The 105-mm (4.13-in) gun is fed by two revolver-type magazines, each of which hold six rounds of fixed ammunition for ready use.

The **Jagdpanzer SK-105** was designed by Steyr in the mid-1960s to meet an Austrian army requirement for a highly mobile and hard-hitting tank destroyer suitable for operation in Austria's unique terrain. The first prototype was completed in 1967, and production began in the early 1970s. By early 1983 about 400 vehicles had been built, 150 for the Austrian army and the remainder for the export market, in which sales have been made to Argentina, Bolivia, Morocco, Nigeria and Tunisia. The engine, transmission, tracks, suspension and many other automotive components are identical to those of the Steyr-Daimler-Puch family of tracked vehicles, which have also been exported in large numbers.

The hull of the SK-105 is of all-welded steel armour, with the driver's compartment at the front, the turret in the centre, and the engine and transmission at the rear. Over its frontal arc the vehicle has complete protection from attack by all weapons up to 20-mm calibre, protection against small arms fire being provided over the remainder of the vehicle.

The turret is a modified version of the French Fives-Cail-Babcock FL-12 as installed on the AMX-13 light tank, and is of the oscillating type, with the gun fixed to the upper part, which pivots on the lower part. The commander is seated on the left and the gunner on the right, both with a hatch cover and observation devices. The main armament comprises a 105-mm (4.13-in) gun fitted with a thermal sleeve and a muzzle-brake; elevation is +13° and depression −8°, and turret traverse is 360°. Ammunition stowage is provided for totals of 44 105-mm (4.13-in) main armament rounds and 2,000 rounds of 7.62-mm ammunition for the co-axial machine-gun. The 105-mm (4.13-in) gun is fed by two revolver-type magazines in the turret bustle, this enabling the gun to fire until the ammunition is exhausted. One of the crew then has to leave the vehicle in order to reload the magazines. The empty brass cartridge cases are ejected from the turret through a small trap in the bustle. The fire-control system includes telescopes for both the commander and gunner, with an infra-red/white-light searchlight above this. The latter enables targets to be engaged at night. Mounted on each side of the turret is a bank of three electrically-operated smoke-dischargers.

The engine and transmission are at the rear, the latter being a ZF manual box with six forward and one reverse gears. Suspension is of the torsion-bar type, and consists of five dual rubber-tyred road wheels with the drive sprocket at the rear, idler at the front and three track-return rollers. Standard equipment includes an NBC system and a heater.

Variants of the SK-105 include the **Greif** armoured recovery vehicle, a pioneer vehicle and a driver training vehicle. The Greif is fitted with a 6-tonne hydraulic crane, a dozer/stabilizer blade at the front of the hull, a winch with a capacity of 20 tonnes, and full provision for carrying spare parts and tools.

Specification

Crew: 3

Weight: 17.5 tonnes

Dimensions: length (including gun) 7.763 m (25 ft 5⅔ in); length (hull) 5.58 m (18 ft 3⅔ in); width 2.50 m (8 ft 2½ in); height 2.529 m (8 ft 3½ in)

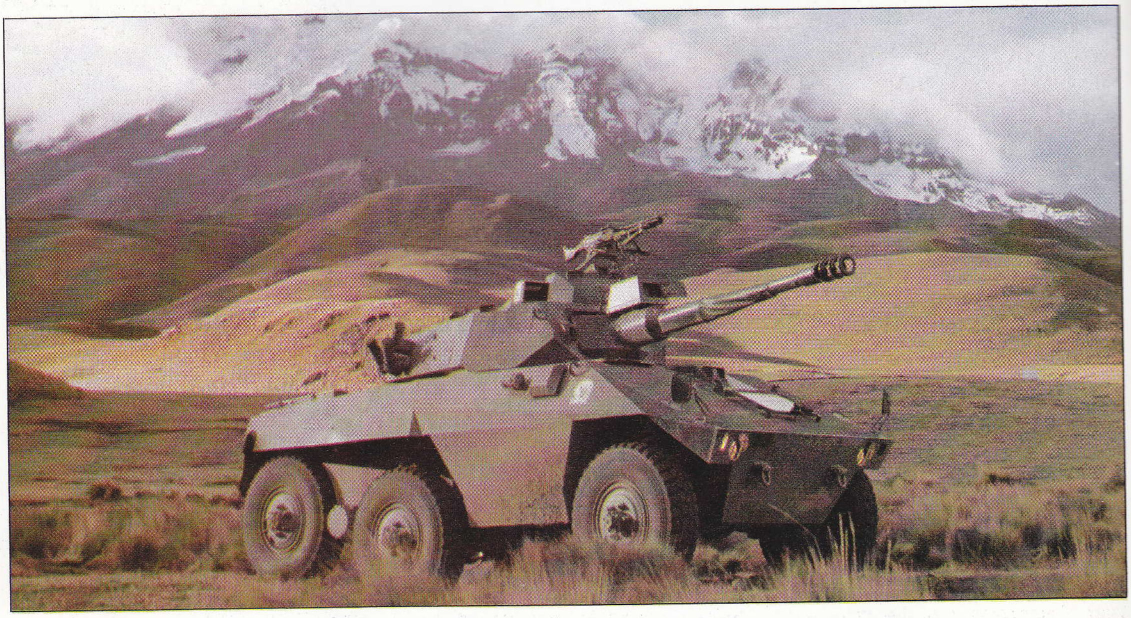
Powerplant: one Steyr 6-cylinder diesel developing 320 hp (239 kW)

Performance: maximum road speed 65 km/h (40 mph); maximum range 520 km (325 miles); fording 1.00 m (3 ft 3 in); gradient 75%; vertical obstacle 0.80 m (2 ft 7½ in); trench 2.41 m (7 ft 11 in)

BRAZIL

ENGESA EE-9 Cascavel Armoured Car

For many years the standard armoured car of the Brazilian army was the US 6×6 M8 Greyhound that was developed in the early 1940s and armed with a 37-mm gun. By the late 1960s spares for the vehicle were becoming difficult to obtain, and its armament was obviously inadequate. The São Paulo company ENGESA had already converted many trucks, for example from 6×4 to 6×6 configuration, so giving them an excellent cross-country mobility. ENGESA then went on to develop two armoured vehicles to meet the requirements of the Brazilian army: these were the 6×6 **EE-9 Cascavel** armoured car and the 6×6



The latest production ENGESA EE-9 Cascavel armoured car, showing the laser rangefinder mounted externally over the 90-mm (3.54-in) gun and 7.62-mm machine-gun mounted externally at the commander's station. This vehicle has been widely used by the Iraqi army during the recent conflict with Iran.

EE-11 Urutu armoured personnel carrier, which shared many common automotive components although their layouts are quite different. The first prototype of the EE-9 Cascavel, named after a Brazilian snake, was completed in 1970 and was followed by a batch of pre-production vehicles before the first production vehicles were completed at the company's new facility at São José dos Campos in 1974. Since then large numbers have been built not only for the Brazilian army but also for many other countries around the world including Bolivia, Chile, Colombia, Cyprus, Gabon, Iraq, Libya, Tunisia and Uruguay, to name a few. The Cascavel has been used operationally by the Iraqi army in the recent war with Iran.

Although some five different marks of the Cascavel have now been produced, the layout of all EE-9s is essentially the same. The armour is of an unusual design developed by the company in conjunction with the University of São Paulo, and consists of an outer layer of hard steel with an inner layer of softer steel roll-bonded and heat-treated to give the maximum possible protection within the weight limit of the vehicle; increased protection is provided over the frontal arc.

The driver is seated at the front of the vehicle on the left, with the two-man turret in the centre, and the engine and transmission at the rear. The engine is either a Detroit Diesel or a Mercedes-Benz diesel, coupled to an automatic or manual transmission. Spare parts for both the engine and transmission are available from commercial sources all over the world. All six wheels are powered, power-assisted steering is provided on the front two wheels. The rear suspension is of the ENGESA-designed Boomerang type that gives excellent cross-country mobility.

The initial **Cascavel Mk I** had the same gun as the M8, but all of these vehicles have now been rebuilt with the ENGESA turret armed with a 90-mm (3.54-in) gun. The **Cascavel Mk II** was for export only, and has a French Hispano-Suiza H-90 turret armed with a 90-mm (3.54-in) DEFA gun. The other models, the **Cascavel Mks III, IV** and **V**, have a two-man ENGESA-designed turret armed with a 90-mm (3.54-in) Cockerill Mk III gun (produced in Brazil by ENGESA), a 7.62-mm machine-gun mounted co-axially with the main armament, and a 12.7-mm or 7.62-mm machine-gun mounted on the roof for anti-aircraft defence.

As with most armoured cars today, a wide range of optional equipment can be fitted to the Cascavel, including a fire-control system, a laser rangefinder mounted externally over the main armament, a laser rangefinder operating through the gunner's sight, day/night sights for commander and gunner, an NBC system, and a ventilation system. All current models have a central tyre-pressure regulation system to enable the driver to adjust the ground pressure to suit the terrain.

Specification

Crew: 3

Weight: 12 tonnes

Dimensions: length (gun forward) 6.22 mm (20 ft 5 in); length (hull) 5.19 m (17 ft 0⅓ in); width 2.59 m (8 ft 6 in); height 2.29 m (7 ft 6 in)

Powerplant: one Detroit Diesel 6V-53 6-cylinder diesel developing 212 hp (158 kW)

Performance: maximum road speed 100 km/h (62 mph); maximum range 1000 km (620 miles); fording 1.00 m (3 ft 3 in); gradient 60%; vertical obstacle 0.60 m (1 ft 11⅔ in); trench not applicable

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USA

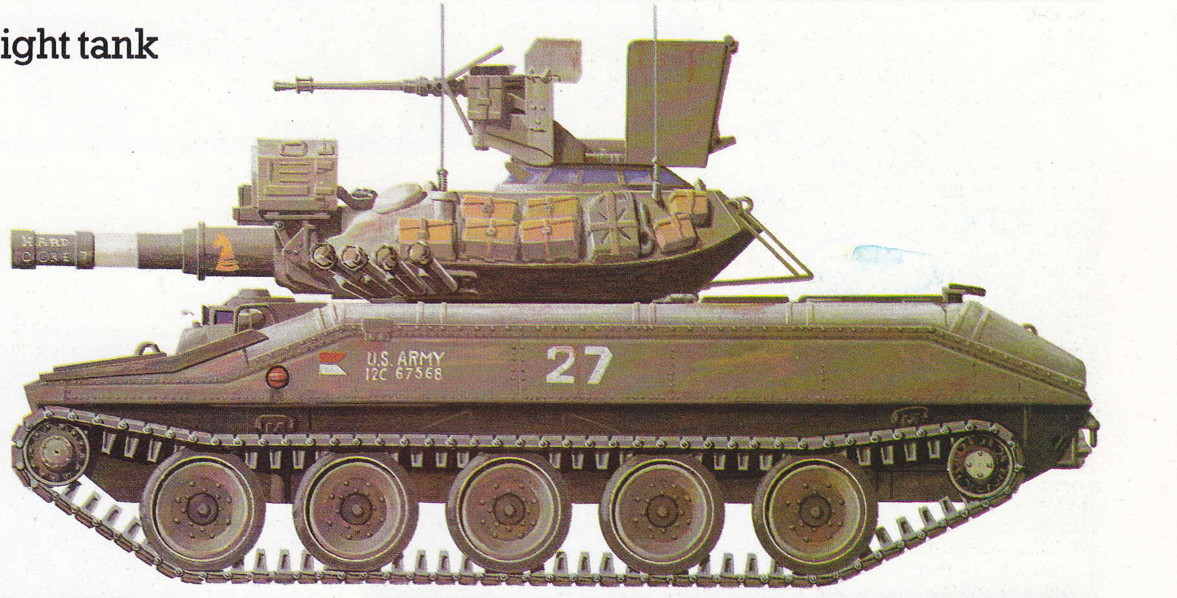
M551 Sheridan light tank

In the mid-1950s the only mobile weapons with a direct-fire capability in the American airborne divisions were the 76-mm (3-in) M41 light tank and the 90-mm (3.54-in) M56 self-propelled anti-tank gun. In 1959 a requirement was issued for a new air-portable vehicle to replace both the M41 and M56, and development of such a vehicle started under the name **Armored Reconnaissance/Airborne assault Vehicle (AR/AAV)** and the designation of the **XM551.** The Allison Division of General Motors was subsequently awarded the development contract, and a total of 12 prototypes was built. In 1965 a four-year production contract was awarded to the company, although at that time the vehicle had not been fully accepted for service. Production continued until 1970, by when a total of 1,700 vehicles had been built. The XM551 was officially classified fit for service in 1966 and called the **M551 General Sheridan.** Although it was evaluated by a number of countries the type was never sold overseas, though it was deployed with the US Army to Europe, South Korea and Vietnam. In the last theatre the M551 earned itself a bad reputation, many faults soon becoming apparent, especially with the 152-mm (6-in) main armament, the powerpack and the very thin belly armour, which provided little protection from mines, one of the more common Vietcong weapons.

In the late 1970s the M551 was withdrawn from most front-line units, and in early 1983 it remained in service only with the tank battalion attached to the 82nd Airborne Division, though a few were also attached to the Arkansas National Guard. Large numbers are also used by the National Training Center at Fort Irwin, California, where they have been modified to resemble Soviet vehicles such as the ZSU-23-4 23-mm self-propelled anti-aircraft gun, BMP-1 MICV and the 122-mm (4.8-in) M-1973 self-propelled howitzer.

The hull of the M551 is of welded aluminium construction, while the turret is of steel construction. The driver is seated at the front in the centre, the turret is in the centre of the hull, and the engine and transmission are at the rear. Suspension is of the torsion-bar type, and consists of five dual rubber-tyred road wheels with the drive sprocket at the rear and idler at the front; there are no track-return rollers. A flotation screen is carried collapsed around the top of the hull and when this has been erected the M551 is fully amphibious, being propelled in the water by its tracks at a speed of 5.8 km/h (3.6 mph).

The main armament consists of a M81 152-mm (6-in) gun/missile launcher that can fire a Shillelagh missile or one of four types of combustible-case conventional ammunition, namely HEAT-T-MP, WP, TP-T and canister. The last was of some use in Vietnam for beating off massed guerrilla attack at close quarters. The mix of conventional ammunition and missile depended on the mission being undertaken, but was typically 20 conventional rounds and eight missiles. A 7.62-mm machine-gun was mounted co-axial with the main armament and a 12.7-mm machine gun, with a shield, was mounted on top of the commander's cupola for local and anti-aircraft defence. Space was so cramped inside the M551 that much of the machine-gun ammunition was carried externally on the sides of the turret.



Above: M551 Sheridan, as deployed to Vietnam, showing extensive external turret stowage and additional protection for the commander.

A standard Sheridan during tests at Fort Knox. About 1700 of these vehicles were built between 1966 and 1970, but only one battalion now remains operational, with the 82nd Airborne Division. Other vehicles have been converted to resemble Soviet vehicles such as the ZSU-23-4 and BMP-1 for use at the National Training Centre, Fort Irwin.

Specification

Crew: 4

Weight: 15.83 tonnes

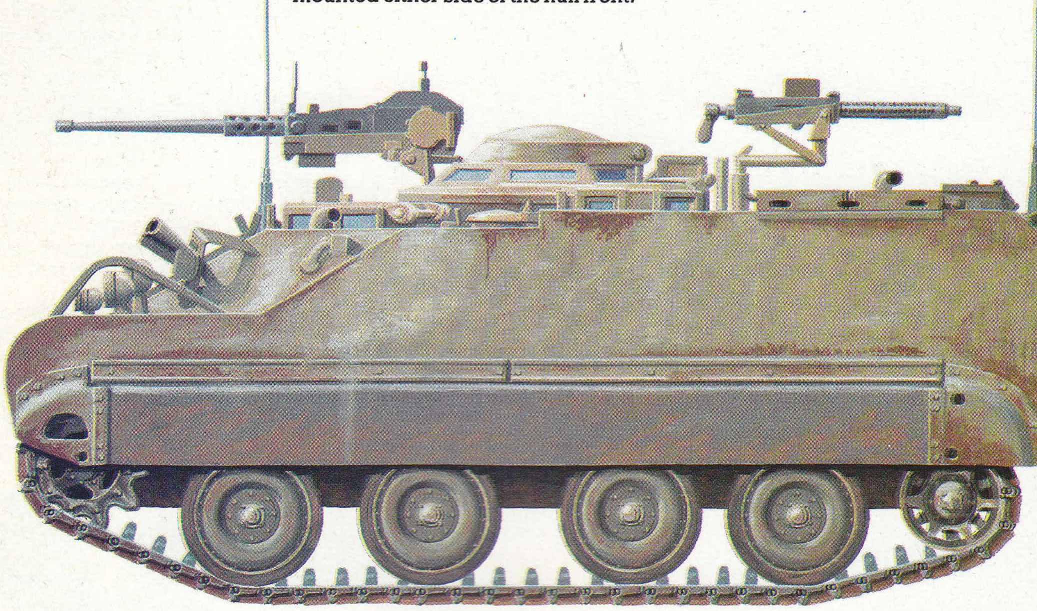
Dimensions: length 6.299 m (20 ft 8 in); width 2.819 m (9 ft 3 in); height (overall) 2.946 m (9 ft 8 in)

Powerplant: one Detroit Diesel 6V-53T 6-cylinder diesel developing 300 hp (224 kW)

Performance: maximum road speed 70 km/h (43 mph); maximum range 600 km (310 miles); fording amphibious; gradient 60%; vertical obstacle 0.838 m (2 ft 9 in); trench 2.54 m (8 ft 4 in)

USA

Lynx Command and Reconnaissance Vehicle



Lynx Command and Reconnaissance vehicle of the Canadian Armed Forces, armed with a 12.7-mm M2HB machine-gun forward and a 7.62-mm machine-gun at the rear. A bank of three electrically-operated smoke dischargers is mounted either side of the hull front.

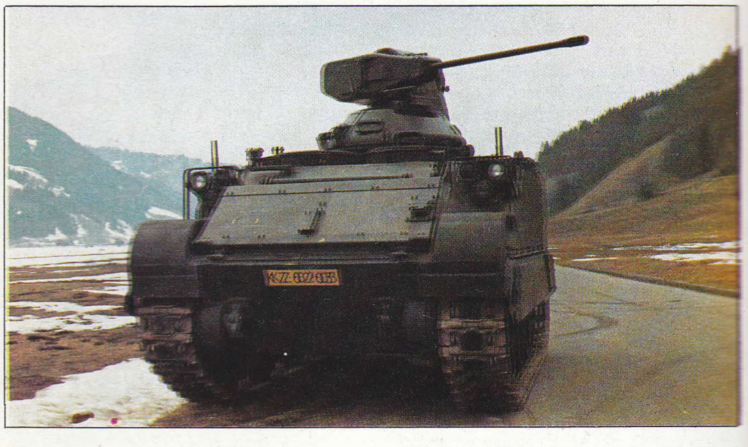
When the M113 armoured personnel carrier entered production at FMC's facility at San Jose in 1960, it was realized that in addition to being used for a wide range of roles its automotive component could also be used in other armoured vehicles. At that time the US Army had already selected the M114 vehicle to carry out the role of command and reconnaissance, but the M114 did not prove a successful design and it has long been phased out of service, and it was never sold overseas. FMC then designed and built a command and reconnaissance vehicle using automotive components of the diesel-powered M113A1, and this was subsequently selected by Canada, which ordered 174 vehicles under the name **Lynx**, and by the Netherlands, which ordered 250 vehicles. all of these were delivered by 1968. The vehicle is often called the M113 and a half!

In comparison with the M113 the Lynx has a lower-profile hull, the powerpack repositioned to the rear, and one road wheel less on each side. The hull is of all-welded aluminium construction that provides the crew with complete protection from small arms fire and shell splinters. The driver is seated at the front of the vehicle, with the commander to his rear and right. The radio operator/observer is seated to the left rear of the commander. The engine compartment is at the rear of the hull on the right side, with access hatches in the roof and hull rear.

Suspension is of the torsion-bar type, and consists of four dual rubber-tyred road wheels on each side with the drive sprocket at the front and the idler at the rear; there are no track-return rollers. The Lynx is fully amphibious, being propelled in the water by its tracks at a speed of 5.6 km/h (3.5 mph). Before the vehicle enters the water a trim vane is erected at the front of the hull, electric bilge pumps are switched on, and rectangular covers erected around the air inlet and exhaust louvres on the hull top to stop water entering the engine compartment, the vehicle having very limited freeboard. Vehicles such as the M113 and the Lynx can cross only calm rivers and lakes, open-sea landings almost inevitably resulting in swamping.

The commander of the Lynx has an M26 hand-operated turret, with vision blocks for all-round observation and an externally-mounted standard 12.7-mm M2HB machine-gun for which 1,155 rounds of ammunition are carried. The radio operator/observer has a pintle-mounted 7.62-mm machine-gun with 2,000 rounds. In addition a bank of three electrically-operated smoke-dischargers is mounted at the front of each side of the hull firing forwards.

The Dutch vehicles have a slightly different internal layout, and as originally supplied were slightly lighter. More recently all of these vehicles have been fitted with a Swiss Oerlikon-Buhrle GBD-AOA one-man turret armed with a 25-mm KBA-B cannon. This has three rates of fire: single-shot, 175 rounds per minute and 570 rounds per minute. Two hundred rounds of ready-use ammunition are carried for the cannon, of which 120 are high explosive and the other 80 armour-piercing. An added advantage for the Dutch is that this Oerlikon cannon (in a different one-man power-operated turret) is also installed in the FMC-designed armoured infantry fighting vehicles of the Dutch army, so assisting in ammunition commonality.



Specification

Crew: 3
Weight: 8.775 tonnes
Dimensions: length 4.597 m (15 ft 1 in); width 2.413 m (7 ft 11 in); height (including armament) 2.171 m (7 ft 1½ in)
Powerplant: one Detroit Diesel Type 6V53 6-cylinder diesel developing 215 hp (160 kW)
Performance: maximum road speed 70.8 km/h (44 mph); maximum range 523 km (325 miles); fording amphibious; gradient 60%; vertical obstacle 0.609 m (2 ft 0 in); trench 1.524 m (5 ft 0 in)

All Dutch vehicles have now been fitted with a Swiss Oerlikon-Buhrle one-man turret armed with a 25-mm KBA-B cannon. This is also fitted to the Dutch army's Armoured Infantry Fighting Vehicles, thus ensuring ammunition supply on the battlefield.

UK

Daimler Ferret Scout Car

Following the success of the Daimler Dingo scout car in World War II, the British War Office issued a requirement for a new scout car in 1946 and in the following year Daimler Ltd of Coventry was awarded the development contract. The first prototype was completed in 1949, and after user trials the vehicle was accepted for service as the **Ferret** scout car, although it was at one time to be called the **Field Mouse.** Production continued at Daimler for the home and export markets until 1971, by which time just over 4,400 vehicles had been built. In 1983 the Ferret was still being used in some numbers by the British army and by some 30 other countries in almost every part of the world with the exception of the Americas.

All versions of the Ferret have the same basic layout, with the driver at the front, the commander/gunner in the centre, and the engine and transmission at the rear. The all-welded steel hull has a maximum thickness of 12 mm (0.47 in) and provides the crew

A Daimler Ferret Mk 1 scout car (left) armed with a Bren light machine-gun, and a Ferret Mk 2/3 on the right armed with a 7.62-mm machine-gun. A total of 4409 vehicles were built for home and export markets by the time production was completed in 1971.

US Light Tank Developments

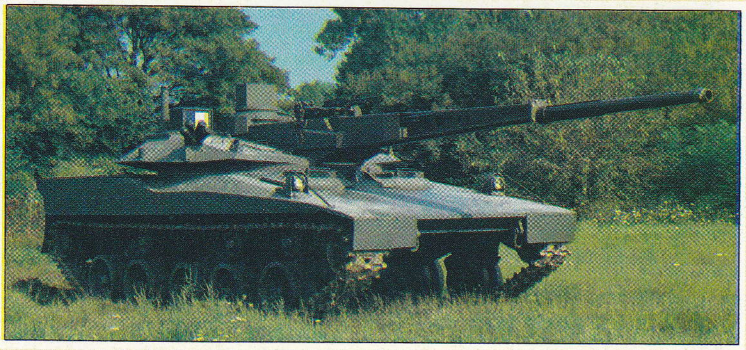
The United States is one of the few countries to have continued with the development of light tanks after World War II. The M24 Chaffee remained the standard light tank of the US Army after the war and saw action in Korea, Vietnam, Laos and Pakistan. It was replaced by the M41 light tank armed with a 76-mm (3-in) gun, the vehicle sharing many common automotive components with the M42 twin 40-mm self-propelled anti-aircraft gun and the M52 105-mm (4.13-in) and M44 155-mm (6.1-in) self-propelled howitzers. At the same time the M56 Scorpion 90-mm (3.54-in) self-propelled anti-tank gun was developed specifically for use by the 82nd and 101st Airborne Divisions, which were then earmarked for rapid deployment by air to any part of the world. The M56 was not considered a successful design, and has long been phased out of service.

In the mid-1950s the Aircraft Armament Corporation built prototypes of a light tank called the T92: this had a very low profile and was armed with a 76-mm (3-in) gun in a flat cleft turret, and with a 7.62-mm and a 12.7-mm machine-gun mounted one on each side of the gun in an individual turret.

In the 1960s the M41 and the M56 was replaced by the M551 General Sheridan Armoured Reconnaissance/Airborne Assault Vehicle (AR/AAV) of which some 1,700 were built by the Allison Division of the General Motors corporation between 1966 and 1970. The M551 was deployed to Vietnam, where it fared badly. With hindsight one can see that it was probably the wrong vehicle to send to that country in the first place.

When the M551 was phased out of service with the armoured and mechanized divisions in the United States, South Korea and Europe it was replaced by the M60A2 MBT as it was generally believed that light vehicles would not survive long against tanks such as a T-72. The 152-mm (6-in) gun/missile-launcher, when being used to launch a Shillelagh missile, had a relatively low rate of fire in comparison with that of a standard gun tank: at about the same time all the M60A2s armed with the Shillelagh weapon system were phased out of service and returned to the United States for conversion into other roles. In 1983 there is just one operational M551 battalion and this is with the 82nd Airborne Division.

In more recent times the United States has formed the Rapid Deployment Force (RDF), which is earmarked for potential trouble spots such as the Middle East. Some of the equipment, especially that for the US Marine Corps, is forward-deployed on ships in the Middle East, but much of the equipment for the US Army will have to come by aircraft such as the Lockheed C-5A Galaxy, despite the fact these are in short supply. Aircraft such as the C-5A can carry almost every item in the inventory of the US Army, including the M1 MBT, but then it was realized that it would be much more economical to carry a number of smaller and lighter vehicles. So the Mobile Protected Gun System (or Mobile Protected Weapon System) was born, this being a joint US Army/US Marine Corps project. At the time of writing two paths were being considered, one for the hybrid concept which will probably be based on an existing vehicle, and the other for a conceptual design which may also be based on an existing vehicle or represent a brand new start. Such is the urgency that the hybrid vehicle will be in service first, followed by the conceptual model a few years later. As with the earlier Light Armored Vehicle (LAV) competition, also a joint US Army/US Marine project, there has already been some disagreement as the US Marines want a vehicle that can be lifted by a Sikorsky CH-53 helicopter while the US Army wants something with a bit more armour, which will of course make the vehicle heavier.



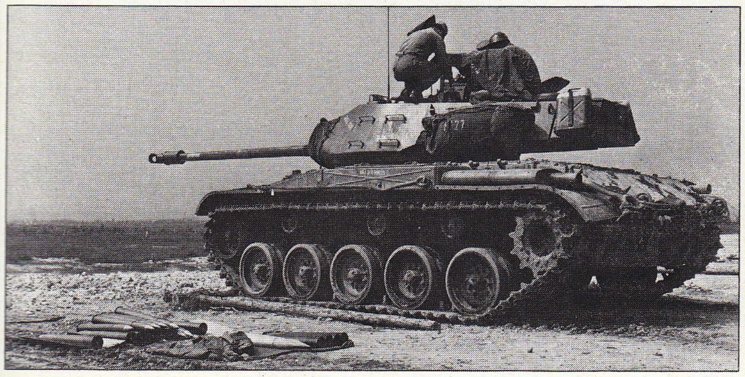
The High Survivability Test Vehicle has a three-man crew, any of whom can fire the 75-mm ARES cannon.

In mid-1981 three companies (Alvis, GMC and Cadillac Gage) were awarded contracts for the hybrid approach, while seven companies (AAI, Alvis, Chrysler (now General Dynamics), FMC, PACCAR, Bell and Teledyne) were awarded contracts for the conceptual approach.

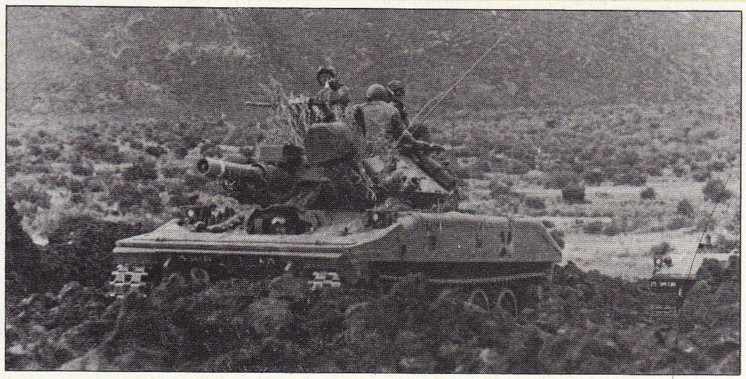
The AAI entry will be based on its private-venture Rapid Deployment Force Light Tank (RDF/LT) which was shown in 1980. This weighs about 14 tonnes, has a three-man crew and is armed with a 75-mm (2.95-in) ARES automatic cannon fed from an automatic magazine holding 60 rounds of ammunition, so enabling a high rate of fire to be achieved. It is powered by a GMC 6V53T 6-cylinder diesel developing 350 hp (261 kW) to produce a maximum speed of 64 km/h (40 mph).

In the mid-1970s two experimental vehicles were built as part of the Armored Combat Vehicle Technology Program to see if a highly mobile vehicle with a rapid-fire cannon could survive the modern battlefield. These vehicles were the High Mobility Agility Test Vehicle (or HIMAG), and the High Survivability Test Vehicle (Lightweight) or HSTV(L), the latter built by AAI. Both of these test beds have provided a massive amount of information for future US Army projects, not only for the MPWS/MPGS but also for the Future Close Combat Vehicle (FCCV) which could replace the M1 MBT and the M2 Bradley IFV in the 1990s.

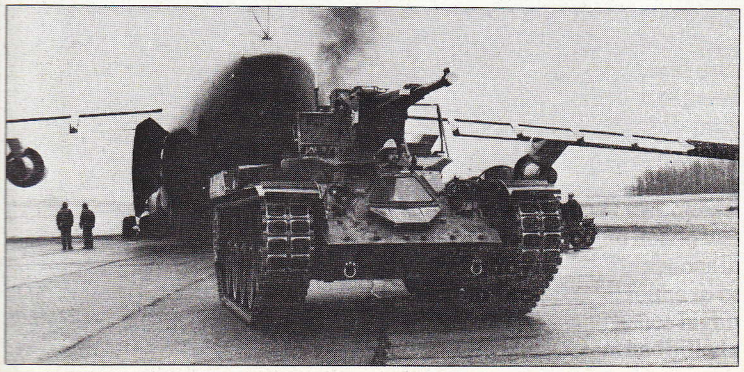
It would appear that in the United States, at least, the light tank is not dead.



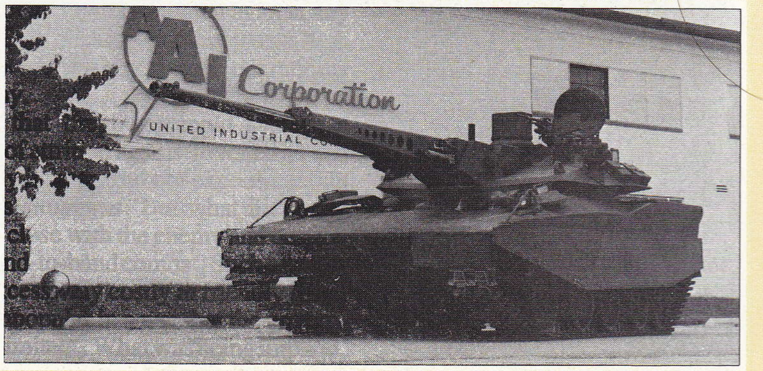
The M41 entered service with the US Army in 1951. It was replaced by the M551 Sheridan but remains in service with several armies.



The M551 Sheridan proved operationally deficient in many respects, and the combined gun/rocket main armament had a low rate of fire.



The HIMAG's ARES 75-mm (2.95-in) automatic cannon does away with the need for a manned turret.



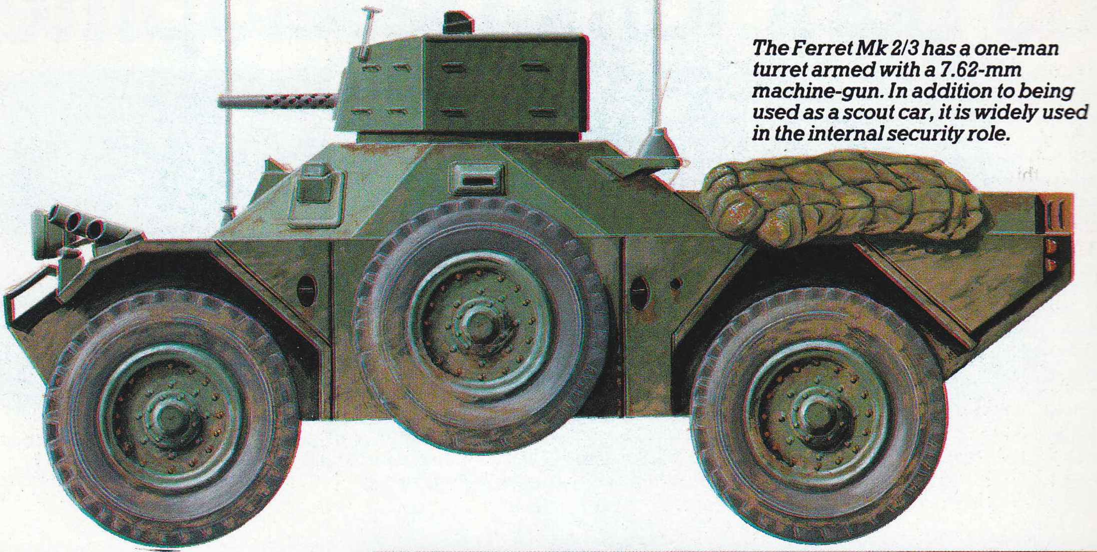
The RDF light tank, a private venture designed to provide the RDF with effective air-portable armour. It too is designed to use the ARES 75-mm (2.95-in) cannon.

Daimler Ferret Scout Car (continued)

with complete protection from small arms fire and shell splinters. Steering is on the front four wheels but is not power assisted.

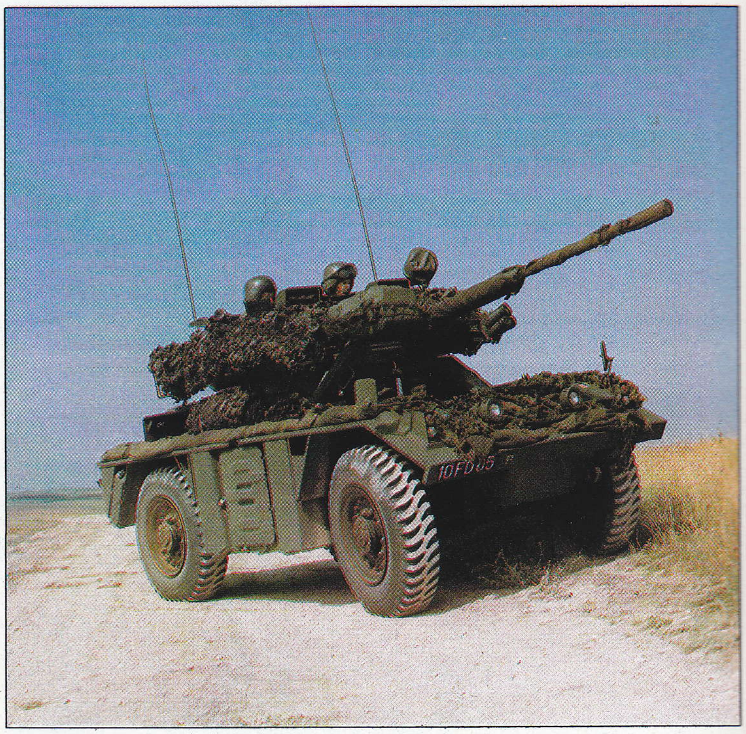
The **Ferret Mk 1** has an open top and is armed simply with a pintle-mounted 7.62-mm Bren or a Browning machine-gun. The **Ferret Mk 1/2** has a three-man crew and a low-profile turret with an externally-mounted machine-gun. The **Ferret Mk 2/3** has a one-man turret armed with a 7.62-mm machine-gun with an elevation between −15° and +45°, turret traverse being 360°. This turret is almost the same as that fitted to the Alvis Saracen armoured personnel carrier. The **Ferret Mk 2/2** was an interesting model developed locally in the Far East, and was a Ferret Mk 2 with an extension collar between the hull top and turret base to give the commander much improved all-round observation. As far as it is known none of this particular model remain in service. The **Ferret Mk 2/6** is the Ferret Mk 2/3 with a British Aircraft Corporation (now British Aerospace Dynamics) Vigilant ATGW mounted on each side of the turret, a further two missiles being carried in reserve on the left side of the hull. The Vigilant was a first-generation wire-guided missile and had a maximum range of 1375 m (1,500 yards), and could be launched from within the vehicle or away from the vehicle with the aid of a separation sight and cable. The **Ferret Mk 3** and **Ferret Mk 4** were essentially earlier versions rebuilt to incorporate stronger suspension units, larger tyres and a flotation screen carried collapsed around the top of the hull; this could be quickly erected by the crew to make the vehicle fully amphibious, being propelled in the water by its wheels.

The **Ferret Mk 5** was the final version, and all of these were rebuilds of earlier vehicles. It has the stronger suspension, larger tyres, flotation screen and a turret in each side of which were two launcher bins for the British Aerospce Dynamics Swingfire ATGW with a range of 4000 m (4,375 yards). These could knock out the heaviest tank, and could be launched from within the vehicle or away from the vehicle with the aid of a separation cable and sight. The Ferret Mk 5 was also armed with a 7.62-mm machine-gun and, like all Ferrets, smoke-dischargers. This model is no longer in service with the British army and was not exported.



The Ferret Mk 2/3 has a one-man turret armed with a 7.62-mm machine-gun. In addition to being used as a scout car, it is widely used in the internal security role.

Specification
Daimler Ferret Mk 2/3
Crew: 2
Weight: 4.395 tonnes
Dimensions: length 3.835 m (12 ft 10 in); width 1.905 m (6 ft 3 in); height 1.879 m (6 ft 2 in)
Powerplant: one Rolls-Royce 6-cylinder petrol engine developing 129 hp (96 kW)
Performance: maximum road speed 93 km/h (58 mph); maximum range 306 km (190 miles); fording 0.914 m (3 ft 0 in); gradient 46%; vertical obstacle 0.406 m (1 ft 4 in); trench 1.22 m (4 ft 0 in) with one channel



The Fox is a Jaguar-powered development of the late production Ferret family. Capable of 104 km/h (64·6 mph) on roads, the Fox is armed with the 30-mm Rarden cannon.

UK

Alvis Scorpion Reconnaissance Vehicle

In the late 1960s the British army decided to build two new reconnaissance vehicles, one tracked and the other wheeled, and these became known as the **Combat Vehicle Reconnaissance (Tracked)** or **Scorpion** and the Combat Vehicle Reconnaissance (Wheeled), or Fox. In 1967 Alvis was awarded a contract to build 17 prototypes of the Scorpion, the first of which was completed in 1969. Trials were so successful that it was accepted for service the following year. Late in 1970 the Scorpion was also ordered by Belgium and an assembly line for the vehicle was set up at Malines in Belgium. First production Scorpions were delivered to the British army in 1972, and by 1983 total orders had passed the 3,000 mark and production was continuing. In addition to being used by the United Kingdom (army and Royal Air Force Regiment) and Belgium, the Scorpion is also used by Brunei, Eire, Honduras, Iran, Kuwait, Malaysia, New Zealand, Nigeria, Oman, Tanzania, Philippines and the United Arab Emirates.

The Scorpion has a hull and turret of all-welded aluminium construction. The driver is seated at the front on the left, the engine is to his right, and the two-man turret is at the rear. Suspension is of the torsion-bar type, and consists of five road wheels with drive sprocket at the front, idler at the rear; there are no track-return rollers. A flotation screen is carried collapsed around the top of the hull, and once this has been erected the vehicle is propelled in water by its tracks at a speed of about 6 km/h (3.7 mph).

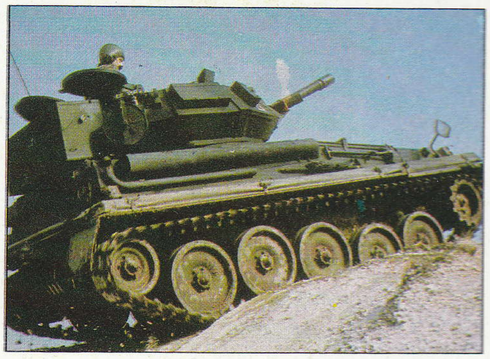
The basic Scorpion has a 76-mm (3-in) gun (a lightened version of that carried in the Saladin armoured car) with an elevation of −10° to +35°; turret traverse is 360°. A total of 40 rounds of ammunition is carried, and this can be a mixture of canister, HESH, HE, smoke (base ejection) and illuminating. A 7.62-mm machine-gun is mounted co-axial with the main armament, and the machine-gun can be used as a ranging as well as a secondary weapon; a total of 3,000 rounds of ammunition are carried for this weapon. The vehicle is also available with a diesel engine in place of the standard petrol engine, and this model has a much increased operating range.

On the same basic chassis a complete family of light tracked vehicles has been developed. **Striker** is the anti-tank model and has five British Aerospace Swingfire ATGWs in the ready-to-launch position. **Spartan** is the troop carrier and can carry four fully equipped troops in addition to its three-man crew. The ambulance model, which is unarmed, is called the **Samaritan**, while the command model, which like Samaritan has a much higher roof, is called the **Sultan.** The recovery model, which uses the same hull as the Spartan, is called the **Samson** and has winches, spades and other specialized equipment. The **Scimitar** has the same hull as the Scorpion but has a two-man turret armed with the same 30-mm Rarden cannon as fitted to the Fox CVR(W). More recently the **Stormer** armoured personnel carrier and the **Streaker** high-mobility load-carrier have been developed, both based on the chassis of the Spartan and developed with company rather than government money.

Specification
Crew: 3
Weight: 8.073 tonnes
Dimensions: length 4.794 m (15 ft 8¾ in); width 2.235 m (7 ft 4 in); height 2.102 m (6 ft 10¾ in)
Powerplant: one Jaguar 4.2-litre petrol engine developing 190 hp (142 kW)
Performance: maximum road speed 80 km/h (50 mph); maximum range 644 km (400 miles); fording 1.067 m (3 ft 6 in); gradient 60%; vertical obstacle 0.50 m (1 ft 8 in); trench 2.057 m (6 ft 9 in)

The Alvis Scorpion in Action

Having first seen action in Iranian hands during the Gulf War, the Scorpion made its British operational debut during the campaign to retake the Falklands. Two troops from the Blues & Royals took part, providing fire support for the final assault on the hills above Stanley.



In the British Army the Scorpion is manned by the Royal Armoured Corps and deployed in Belize, the UK and in West Germany with the British Army of the Rhine. It can be quickly airlifted to any part of the world by RAF Lockheed C-130 Hercules transports.

Since 1972 some 3,000 units of the Scorpion Combat Vehicle Reconnaissance (Tracked) have been produced by Alvis Ltd of Coventry for both the home and export markets in which the United Kingdom and Belgium have been by far the largest customers. In British army service the Scorpion has not seen combat in Europe, although it has been used to patrol airports in the United Kingdom during times of possible terrorist threats, and has been deployed to Belize in Central America to counter a possible invasion by Guatemala. The type is known to have been used by Iran during the war with Iraq and from all accounts has given good service, although there are no actual combat reports currently available.

Scorpions in the Falklands

Following the Argentine invasion of the Falkland Islands in April 1982, a decision was taken by the British government that the islands would be retaken. Two days after the invasion, on 4 April 1982, the Blues and Royals medium reconnaissance regiment (stationed at Windsor) was ordered to provide two reconnaissance troops for deployment with the Falkland Islands task force. Each troop consisted of two 76-mm (3-in) Scorpion and two 30-mm Scimitar vehicles with a supporting Samson armoured recovery vehicle. Within 24 hours the vehicles and their weapons were ready for operations, and were subsequently embarked on the MV *Elk* (the crews embarking on the SS *Canberra*, a requisitioned cruise ship). For the Falklands Islands operation the troop came under the operational command of Headquarters 3rd Commando Brigade based at Plymouth, Devon.

On arrival at Ascension Island the vehicles were offloaded and the crews were able to carry out gunnery practice, with no lack of ammunition. At the same time the vehicles were prepared for wading. All members of the Scorpion family have a flotation screen carried around the top of the hull. This screen can be quickly erected by the crew and the vehicle is then propelled in the water by its tracks at a speed of about 6.5 km/h (4 mph); freeboard forward with screen erected is 0.965 m (3 ft 2 in) and rear 0.711 m (2 ft 4 in). All Scorpions can ford to a depth of 1.067 m (3 ft 6 in) without preparation. At Ascension the two troops of 'B' Squadron were transferred to the assault ship HMS *Fearless*.

The task force itself was organized into a carrier group with the two aircraft-carriers, an amphibious warfare group which included the 3rd Commando Brigade, and a large logistic tail. At Ascension Island the vehicles, weapons and supplies were redistributed so that they would land in roughly the right order. On 26 April an advanced detachment from the task force retook South Georgia Island, but no vehicles took part in this operation as the terrain was unsuitable and the opposition light.

On 21 May the British made their main landing on East Falkland No. 40 Commando and the 2nd Battalion, The Parachute Regiment landing in the area of San Carlos, No. 45 Commando at Ajax Bay, and the 3rd Battalion, The Parachute Regiment at Port San Carlos. As with all amphibious operations, things did not go exactly to plan and it was found that the Scorpions could not be landed on their designated beaches because of overhanging rocks, so they had to be landed on an alternative beach.

The beach-head was secured by the end of the first day and defensive positions prepared against a possible counterattack; at the same time patrols were sent out and the air defences prepared. The Scorpions and Scimitars were

These Scimitars were deployed to Norway by the British Army as part of the ACE Mobile Force which is designed to be airlifted to any threatened part of NATO as a show of force. Key vulnerable areas are Norway, Greece and Turkey.

Above: In addition to the Scimitars and Scorpions deployed to the Falklands, one Samson ARV was also sent; it was also used to carry cargo across the rough terrain.

Left: Scimitars and Scorpions move along the road from Bluff Cove to Stanley. None of these vehicles encountered the Argentinian AML Panhard (4×4) armoured cars.

dug in to stiffen the defences. The Argentinian air force soon launched determined air attacks against the beach-head, and these attacks were engaged by Rapier and Blowpipe surface-to-air missiles, 7.62-mm machine guns and the Scorpions and Scimitars. The Scorpions used their 7.62-mm co-axial machine-guns while the Scimitars used their 7.62-mm machine-guns and 30-mm Rarden cannon. In both these vehicles turret traverse and weapon elevation is manual, but one Scimitar claimed to have hit a McDonnell Douglas A-4 Skyhawk with a 30-mm Rarden round at a range of 1000 m (1,095 yards). Because of the shortage of all-terrain vehicles the Scorpions were also used to carry stores and other supplies inland from the beach.

Once the landings had been consolidated the Scorpions could be used in their proper role, although it was generally thought that the terrain would make their deployment very difficult in most places other than the Port Stanley area, where there were at least some tracks. Scorpions can be carried under the Boeing Vertol CH-47 Chinook helicopter, but the sinking of the *Atlantic Conveyor* left only one of these helicopters operational, severely hampering the progress of all operations.

Across the Islands

On 27 May No. 45 Commando started to move on Port Stanley by the northern route while the 3rd Battalion, The Parachute Regiment advanced via Teal Inlet, these being supported by 3 and 4 Troops with their Scorpions and Scimitars. The 2nd Battalion The Parachute Regiment advanced on Goose Green and Darwin to the south, but without Scorpions and Scimitars as it was believed that this terrain was impassable.

The northern terrain was waterlogged, and the Scorpion and Scimitar drivers had to adopt their techniques very quickly. When the vehicles did occasionally become bogged they used their kinetic-energy ropes, one of which is carried on every vehicle. The kinetic-energy rope is 13.7 m (45 ft) long and 40 mm (1.57 in) in diameter and works as follows: one vehicle backs up to the vehicle that is bogged down and shackles the snatch recovery tow rope onto the towing point, the rope being left coiled on the ground between the two vehicles; the driver of the recovery vehicle then accelerates as fast as possible, the driver of the bogged vehicle 'revving' his engine into gear as the rope becomes taut. On the first pull the vehicle will often move only a few inches, in which case the technique is repeated until the bogged vehicle is on firm ground.

By the end of May the two troops had almost completed their march and were approaching the higher ground west of Port Stanley. No Argentinian Panhard armoured cars had been encountered as these could not operate out of the Port Stanley area owing to the poor nature of the terrain. The American-supplied tracked LVTP7 amphibious armoured personnel carriers used during the initial invasion of the Falklands had all been returned to the mainland by the time the British returned, so none of these were encountered.

On 1 June the first part of the 5th Infantry Brigade landed at San Carlos, and by 3 June the whole brigade was ashore without a single casualty. It was then decided to take the two troops of Scorpions and Scimitars from under the command of the 3rd Commando Brigade in the north and place them under the command of the 5th Brigade in the area of Fitzroy, it being believed that the southern position was in some danger until the other battalions could be brought up from the west. Given the acute shortage of helicopters this transfer could take some time. It was estimated that it would take about two days for the Scorpions and Scimitars to make the journey from the north down to Fitzroy, but in the event they took just six hours, a considerable feat for men and vehicles alike. The reconnaissance vehicles' crews were witness to the attack by the Argentinians on the logistic ships *Sir Galahad* and *Sir Tristram*, and once again engaged the attack aircraft with their 7.62-mm machine-guns and 30-mm cannon. The 1st Battalion, Welsh Guards, sustained heavy casualties during this attack and the Scorpions were this time pressed into service carrying survivors from the beach to the medical aid post.

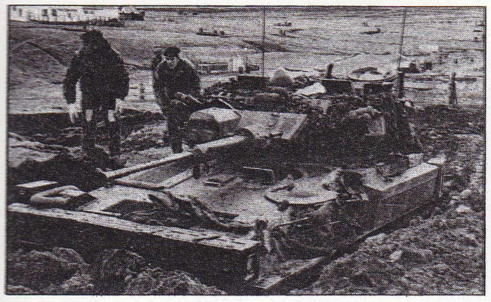
The Scorpions then moved towards Port Stanley in the fire support role, in which they supplemented the 114-mm (4.5-in) guns of the naval task force, Harrier ground-attack aircraft and 105-mm (4.13-in) Light Guns, which had been in action since the first day of the landings.

The 3rd Battalion, The Parachute Regiment carried out an assault on Mount Longdon and achieved initial surprise under the cover of darkness, but soon the enemy was awake and stiff resistance was encountered. It took six hours to take the eastern part of Mount Longdon and four hours to take the western half. During this action Scorpions of 4 Troop provided direct fire support from their 76-mm (3-in) guns firing HESH (High Explosive Squash Head) ammunition. This is designed mainly for use against tanks but is also deadly against field fortifications and entrenched positions.

By early in the morning of 12 June all of the objectives of the 3rd Commando Brigade had been achieved, and the next stage was for 3 Troop to support the 2nd Battalion, The Parachute Regiment in its attack on Wireless Ridge and 4 Troop to support the 2nd Battalion, Scots Guards attacking Tumbledown Mountain. The Scots Guards also carried out a diversionary action against an enemy battalion to the south of the real objective. The strong patrol was supported by 4 Troop, and until the troop leader's Scorpion struck a mine no contact with the enemy was made. None of the Scorpion's three-man crew was badly injured, the troop leader moving to another vehicle to direct fire support against the Argentinian positions. This position was subsequently taken and 4 Troop then resumed its main role of providing fire support for the main attack on Tumbledown Mountain.

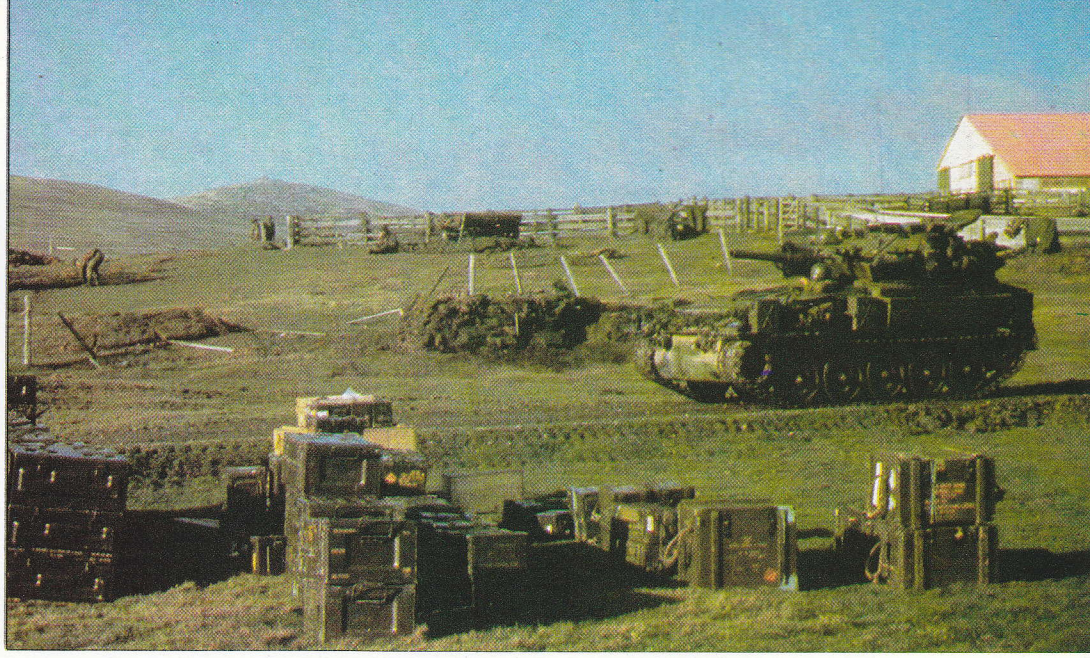
Meanwhile 3 Troop was supporting the 2nd Battalion, The Parachute Regiment, which had suffered substantial losses at Goose Green and Darwin in the absence of maximum possible fire support. In addition to providing fire support, the Scorpions also carried out a new technique commonly known as zapping. In this the Scorpion would engage an Argentinian position with its co-axial 7.62-mm machine-gun firing short bursts which often prompted the Argentinians to open up on the Scorpion, the revealed position then being silenced by the 76-mm (3-in) main gun. A similar technique was employed by the Scimitar as in both cases the co-axial machine-gun was designed as a ranging weapon, in some ways like that of the Centurion and Chieftain MBTs some years earlier.

Once Wireless Ridge had been taken by the 2nd Battalion, The Parachute Regiment, 3 Troop was able to overlook Port Stanley. On 14 June the battalion moved along the road to Port Stanley under cover of the guns of 3 Troop; the vehicles then joined the battalion on the outskirts of the town while the final details of the Argentinian surrender was completed, and at 21.00 on the same day the Argentine commander formally surrendered all forces to the British. Later the Scorpions and Scimitars of 4 Troop from Fitzroy joined up with 3 Troop at



***Above:* A Scimitar armed with 30-mm cannon, dug in at San Carlos Bay, awaits the Argentinian counterattack that never came. One of them shot down an Argentine Skyhawk aircraft.**

***Right:* A Scorpion of the Blues and Royals at San Carlos Bay during the early part of Falklands campaign. Two troops of vehicles were deployed and used in the fire-support role.**



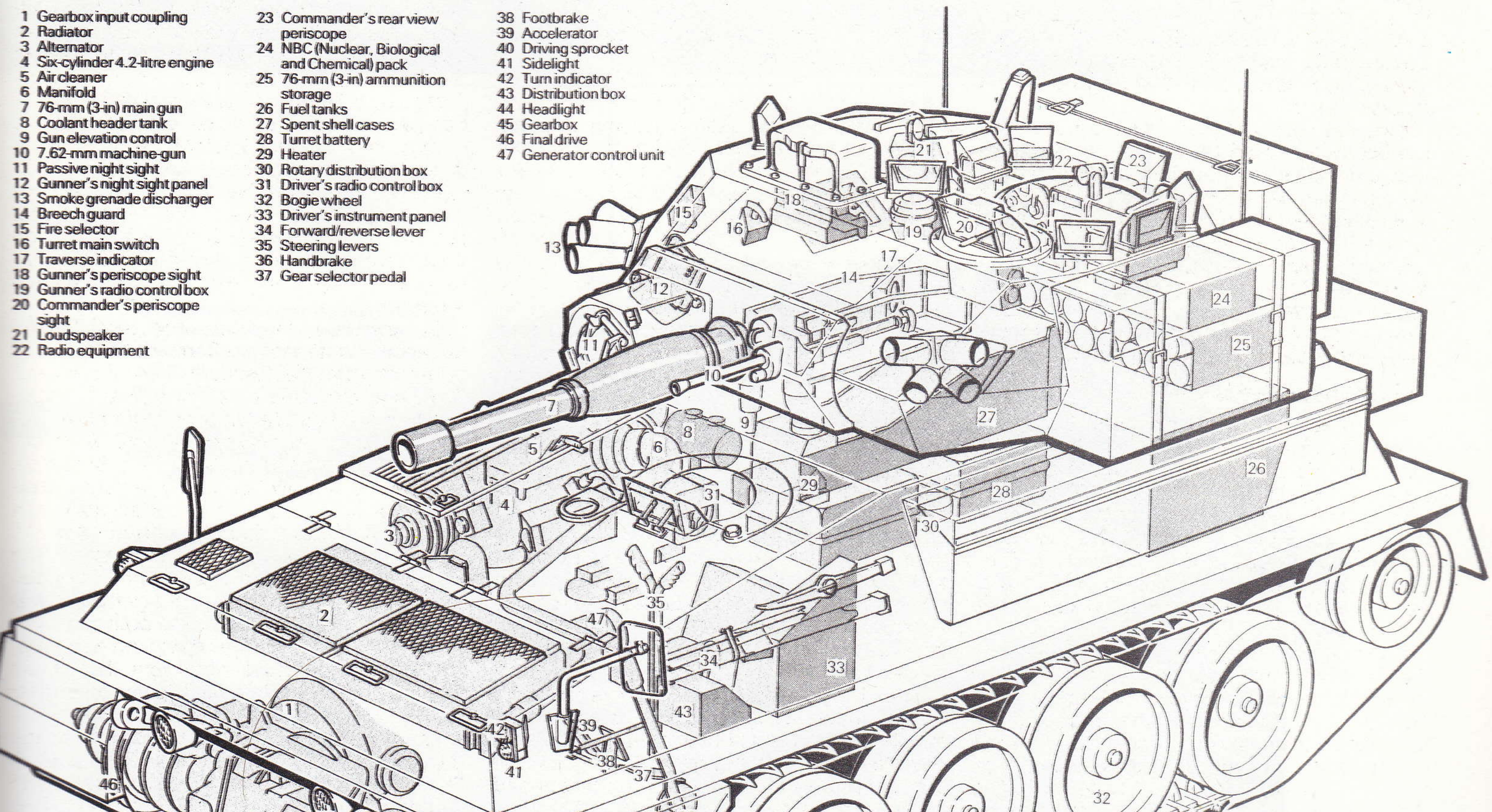
Port Stanley.

At a later date the troops were embarked in the assault ship HMS *Fearless* for the journey back to the United Kingdom. They also took with them two Panhard AML-90 armoured cars that they had captured in Port Stanley. No direct fire engagements took place between the Scorpions and the Panhard AML-90s with their 90-mm (3.54-in) guns, and if there had been there would undoubtedly have been more casualties on the British side. The Scorpion damaged by an anti-tank mine was subsequently airlifted out by a Chinook helicopter and also brought back to the United Kingdom.

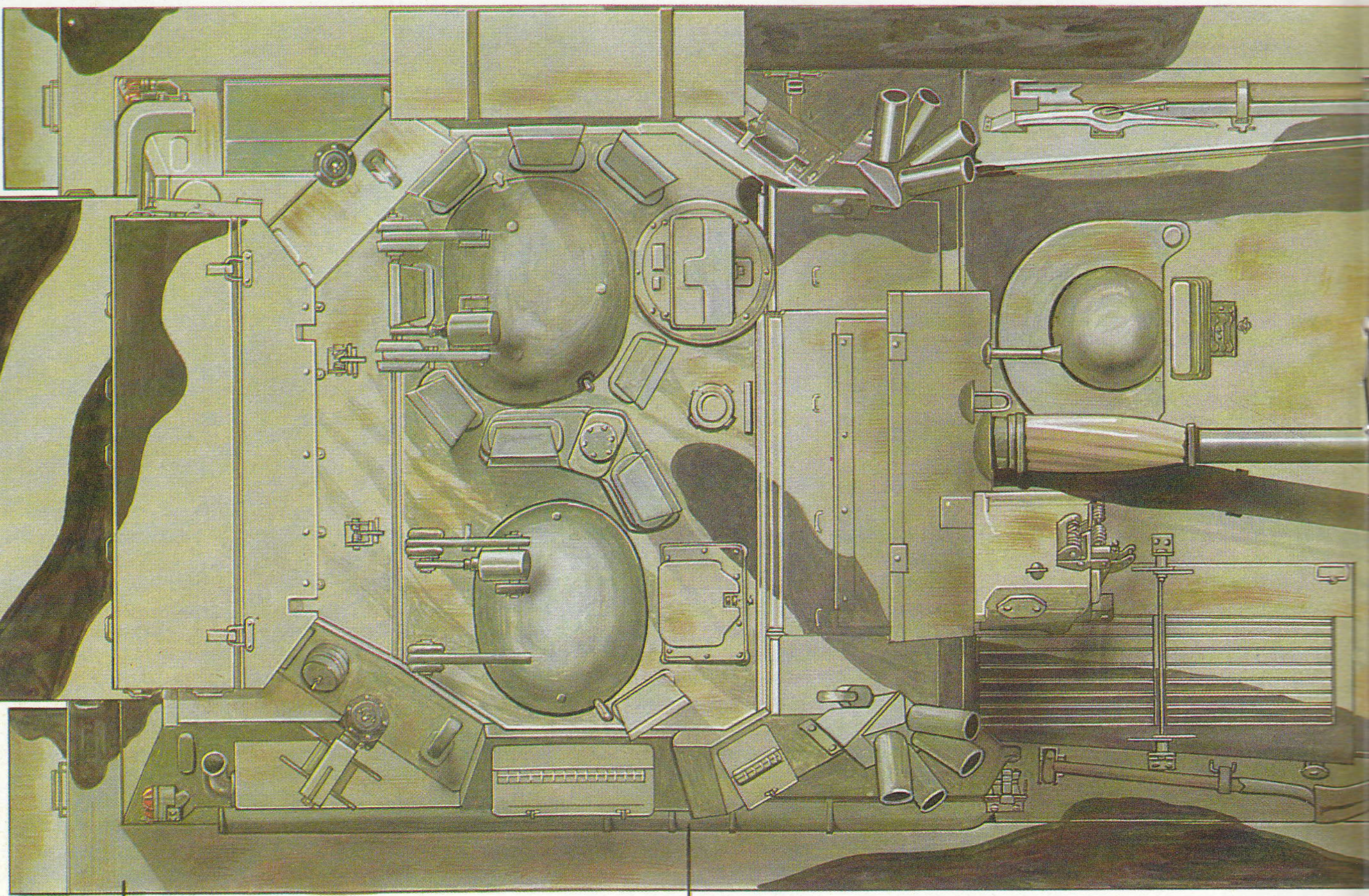
Scorpions and Scimitars were also engaged by Argentine 7.62-mm and 12.7-mm machine-guns and 20-mm light anti-aircraft guns, but no hits on them were recorded. The passive gunner's sight proved to be most useful during the campaign, not only for its original purpose of aiming the main and secondary armaments at night, but also as a general surveillance sight. Compared with Argentinians the British did not take a great deal of night-vision equipment to the Falklands, and much of the hardest fighting was in fact done under the cover of darkness. Since the campaign the British have greatly increased their scales of issue of all types of night-vision equipment, especially to infantry battalions.

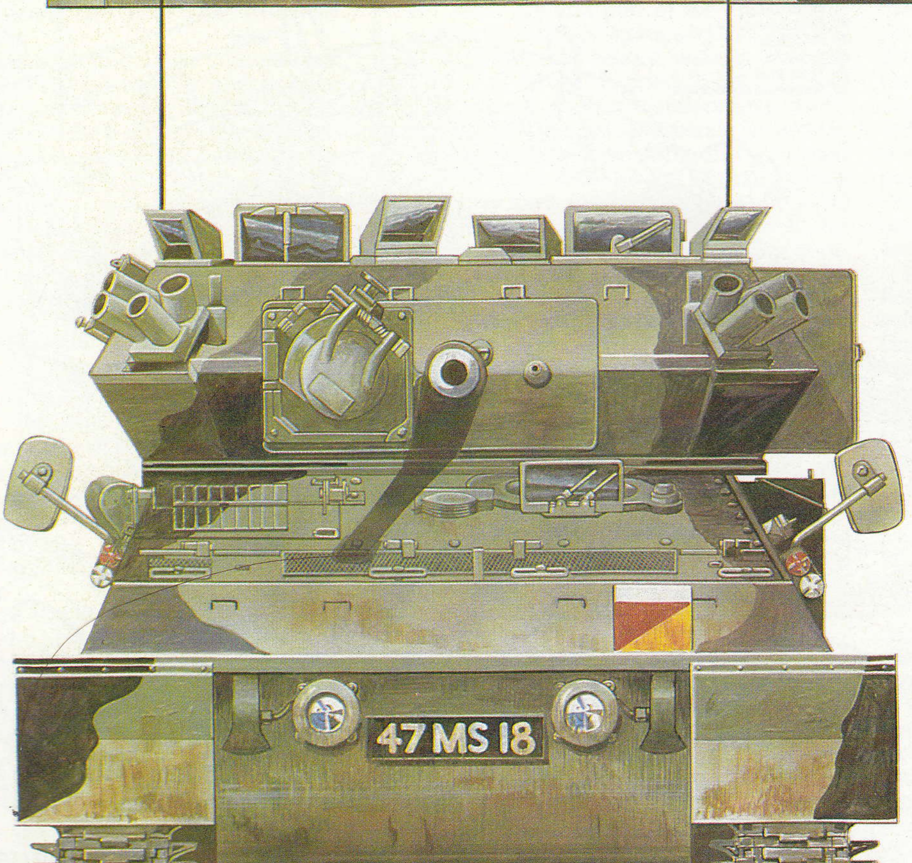
Scorpion Armoured Car cutaway drawing key

1 Gearbox input coupling
2 Radiator
3 Alternator
4 Six-cylinder 4.2-litre engine
5 Air cleaner
6 Manifold
7 76-mm (3-in) main gun
8 Coolant header tank
9 Gun elevation control
10 7.62-mm machine-gun
11 Passive night sight
12 Gunner's night sight panel
13 Smoke grenade discharger
14 Breech guard
15 Fire selector
16 Turret main switch
17 Traverse indicator
18 Gunner's periscope sight
19 Gunner's radio control box
20 Commander's periscope sight
21 Loudspeaker
22 Radio equipment
23 Commander's rear view periscope
24 NBC (Nuclear, Biological and Chemical) pack
25 76-mm (3-in) ammunition storage
26 Fuel tanks
27 Spent shell cases
28 Turret battery
29 Heater
30 Rotary distribution box
31 Driver's radio control box
32 Bogie wheel
33 Driver's instrument panel
34 Forward/reverse lever
35 Steering levers
36 Handbrake
37 Gear selector pedal
38 Footbrake
39 Accelerator
40 Driving sprocket
41 Sidelight
42 Turn indicator
43 Distribution box
44 Headlight
45 Gearbox
46 Final drive
47 Generator control unit

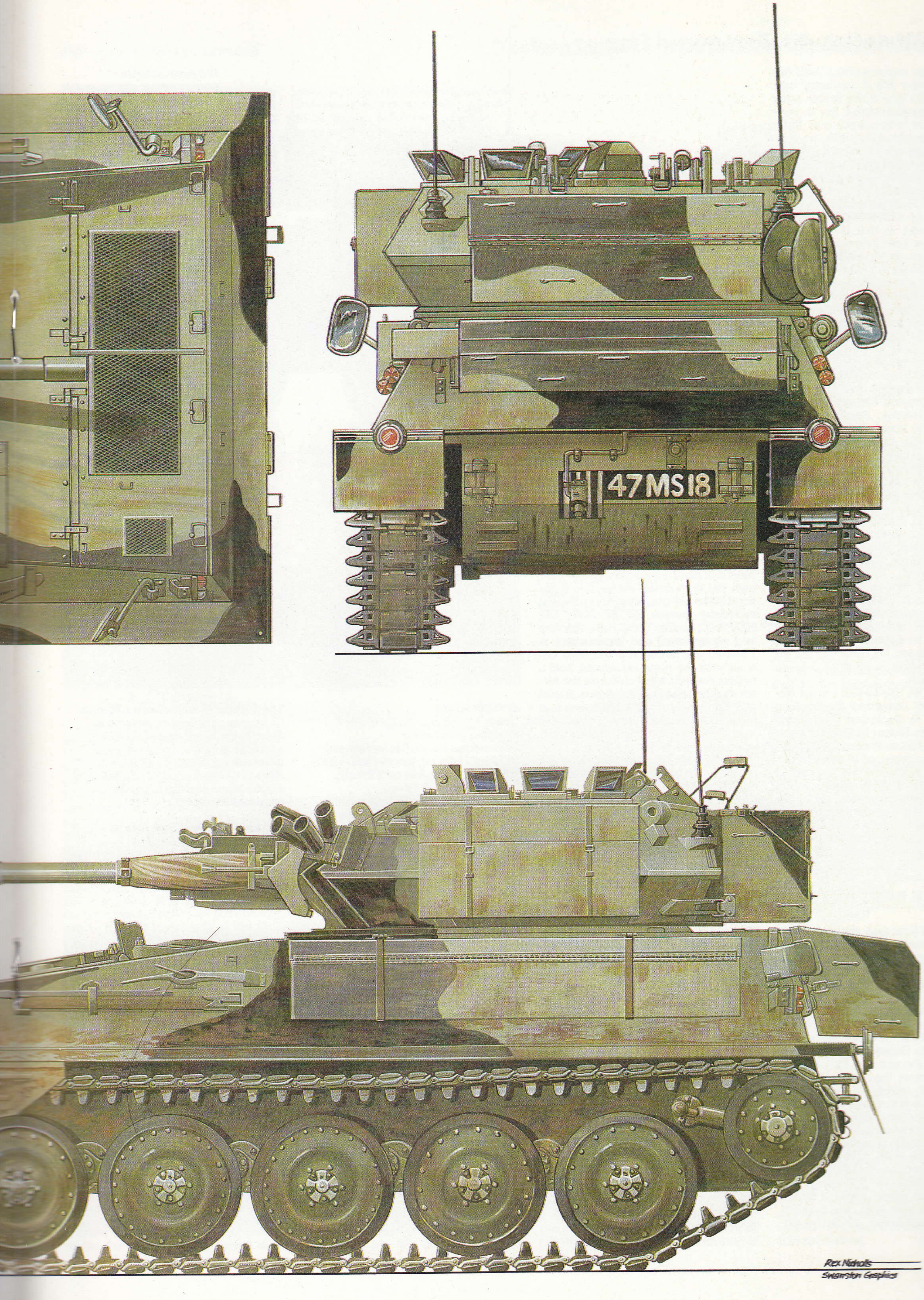


The Alvis Scorpion in Action





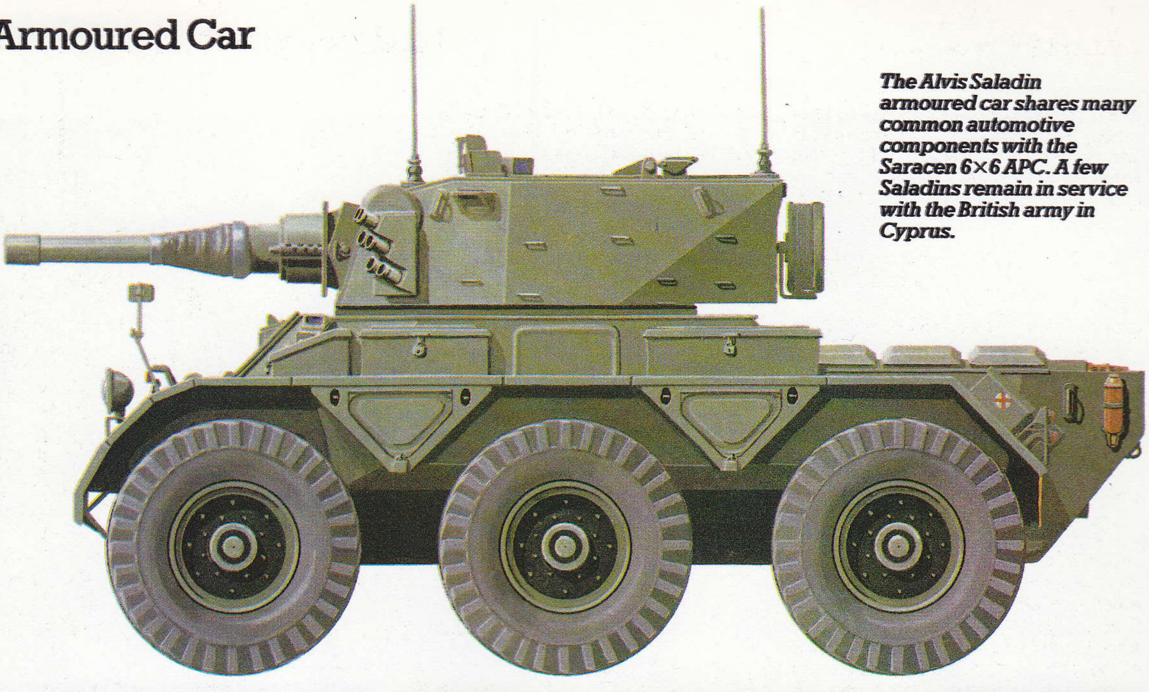
The Alvis Scorpion has extensive external stowage and a bank of smoke dischargers on either side of the turret front. To the right of the 76-mm (3-in) gun is the protective cover for the Rank day/night sight, while to the left is the 7.62-mm co-axial machine-gun, which can also be used as a ranging weapon.



Rex Nicholls
Swanston Graphics

UK

Alvis Saladin Armoured Car



The Alvis Saladin armoured car shares many common automotive components with the Saracen 6×6 APC. A few Saladins remain in service with the British army in Cyprus.

Following the success of the AEC Mk III and Daimler Mk II armoured cars during World War II the British army issued a requirement for a new armoured car with a 2-pdr gun. But it was soon decided that this weapon would be ineffective against the newer vehicles expected in the 1950s, and the Armament Research and Development Establishment then designed a new 76-mm (3-in) gun called the L5.

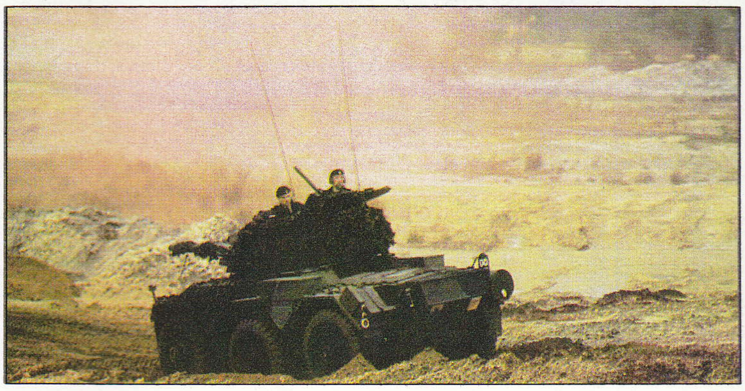
The chassis of the **Saladin**, or **FV601**, is very similar to that of the FV603 Saracen armoured personnel carrier, which was also under development by Alvis at that time. Because of needs of the guerrilla war in Malaya, development of the Saracen was given precedence over that of the Saladin, and because of the high work load at Alvis the first six preproduction Saladins were built by Crossley Motors at Stockport in Cheshire.

The Saladin was accepted for service with the British army in 1956, and production started two years later at Alvis in Coventry. Production continued for the home and export markets until 1972, by which time 1,177 vehicles had been completed. In British army service the Saladin has now been replaced by the Alvis Scorpion tracked vehicle, which is armed with a new version of the 76-mm (3-in) gun called the L23. A small number of Saladins remain in service in Cyprus with the British army, and the type is also used by Bahrain, Ghana, Indonesia, Jordan, Kenya, Kuwait, Lebanon, Libya, Oman, Nigeria, Portugal, Sierra Leone, Sri Lanka, Sudan, Tunisia, United Arab Emirates and both North and South Yemen, although in some cases spares must be a major problem as the UK is no longer handling spares for some countries as a result of political considerations.

The hull of the Saladin is of all-welded steel armoured construction that varies in thickness from 8 mm (0.31 in) up to 16 mm (0.63 in); the turret has a maximum thickness of 32 mm (1.25 in) at the front and 16 mm (0.63 in) at the sides and rear. The driver sits at the front of the vehicle with excellent vision to his front and sides. The other two crew members are seated in the turret with the commander, who acts as the loader, on the right and the gunner on the left. The engine and transmission are at the rear of the hull. All six wheels of the Saladin are powered, with steering on the front four wheels. The vehicle can still be driven with one wheel blown off.

The 76-mm (3-in) gun is mounted in a turret that can be traversed manually through 360°; the gun itself can be elevated from −10° to +20°. A total of 42 rounds of fixed ammunition can be carried, the type being identical to those used in the L23 gun of the Scorpion and including canister, HESH, SH/P, HE, HE/PRAC, smoke (both base ejection and phosphorus) and illuminating. A 7.62-mm machine-gun is mounted coaxial with the main armament, and a similar weapon is mounted on the turret roof for anti-aircraft defence. A total of 2,750 rounds of 7.62-mm ammunition is carried. Mounted on each side of the turret is a bank of six electrically-operated smoke-dischargers.

There were very few variants of the Saladin, one of the more interesting ones being the amphibious model. This was fitted with a flotation screen around the top of the hull, and when this had been erected the vehicle could propel itself on water with its wheels.



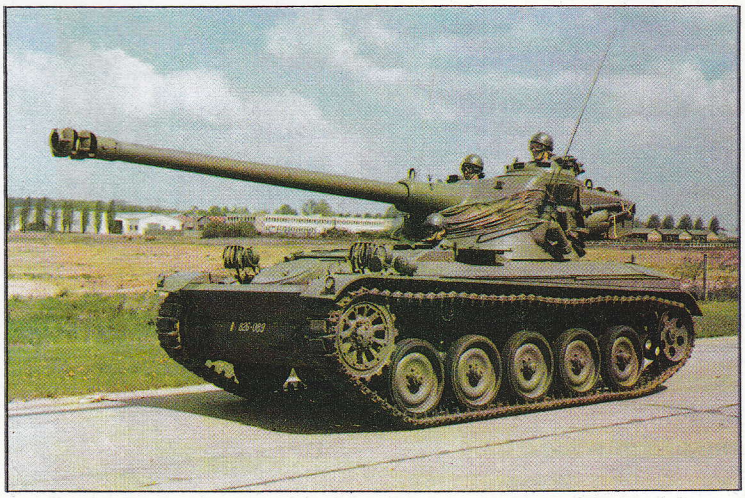
The Saladin is armed with a 76-mm (3-in) gun; a lightened version is fitted in the more recent Scorpion, and fires the same range of fixed ammunition. Between 1958 and 1972 Alvis of Coventry built 1177 Saladins for the home and the lucrative overseas markets.

Specification
Crew: 3
Weight: 11.59 tonnes
Dimensions: length (including gun) 5.284 m (17 ft 4 in); length (hull) 4.93 m (16 ft 2 in); width 2.54 m (8 ft 4 in); height 2.93 m (9 ft 7⅓ in)
Powerplant: one Rolls-Royce B80 8-cylinder petrol engine developing 170 bhp (127 kW)
Performance: maximum road speed 72 km/h (45 mph); maximum range 400 km (250 miles); fording 1.07 m (3 ft 6 in); gradient 46%; vertical obstacle 0.46 m (1 ft 6 in); trench 1.52 m (5 ft 0 in)

FRANCE

AMX-13 Light Tank

The **AMX-13** light tank was one of the three armoured vehicles designed in France immediately after the end of World War II, the other being the Panhard EBR heavy armoured car and the AMX-50 MBT which did not enter service as large numbers of M47s soon became available from the United States. The AMX-13 was designed by the Atelier de Construction d'Issy-les-Moulineaux, the numeral 13 in the designation being the originally specified design weight in tonnes. The first prototype was completed in 1948 and production was under way at the Atelier de Construction Roanne (ARE) by 1952. The AMX-13 continued in production at the ARE until the 1960s, when space was needed for the AMX-30 MBT and AMX-10P IFV family. Production of the whole AMX-13 family, including the light tank, was transferred to Creusot-Loire at Chalon-sur-Saône, where production continues to this day. By early 1983 over 3,000 vehicles had been built and the type remains in service with Algeria, Argentina, Chile, Djibouti, Ecuador, France, El Salvador, India, Indonesia, Ivory Coast, Lebanon, Morocco, Nepal, Peru, Singapore, Tunisia and Venezuela. The AMX-13 was also used by a number of other countries such as India, Israel, the Netherlands and Switzerland, but most of these have now been sold. The chassis of the



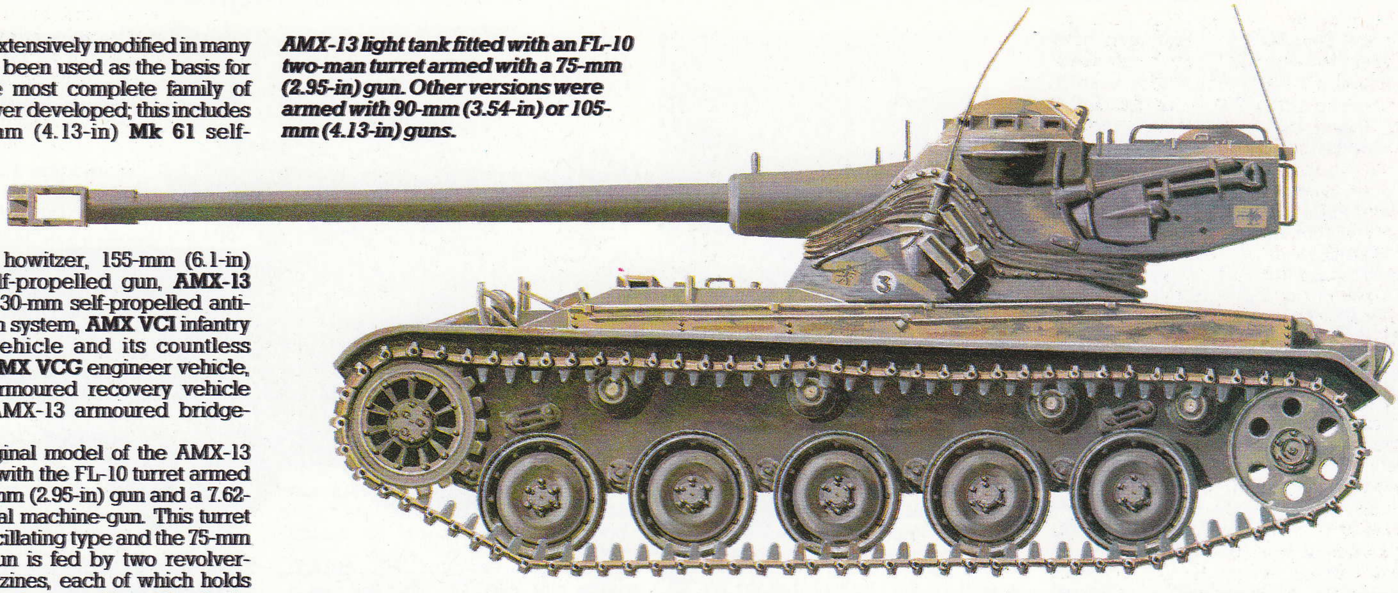
The AMX-13 light tank is fitted with an oscillating turret in which the gun is fixed in the upper part, which in turn pivots on the lower part. The gun can fire until its 12 rounds of ready-use ammunition are exhausted, and then two six-round magazines have to be reloaded manually from outside the vehicle by a crewman.

AMX-13 (extensively modified in many cases) has been used as the basis for one of the most complete family of vehicles ever developed; this includes the 105-mm (4.13-in) **Mk 61** self-propelled howitzer, 155-mm (6.1-in) **Mk F3** self-propelled gun, **AMX-13 DCA** twin 30-mm self-propelled anti-aircraft gun system, **AMX VCI** infantry fighting vehicle and its countless variants, **AMX VCG** engineer vehicle, AMX-13 armoured recovery vehicle and the AMX-13 armoured bridgelayer.

The original model of the AMX-13 was fitted with the FL-10 turret armed with a 75-mm (2.95-in) gun and a 7.62-mm co-axial machine-gun. This turret is of the oscillating type and the 75-mm (2.95-in) gun is fed by two revolver-type magazines, each of which holds six rounds of ammunition. The basic types of ammunition were fixed HE and HEAT, the latter capable of penetrating 170 mm (6.7 in) of armour. This model was used in some numbers by Israel during the 1967 Middle East war, but its gun was found to be ineffective against the frontal armour of the Soviet T-54/T-55 MBTs supplied to Syria and Egypt, so it was soon phased out of service, most ending up in Singapore or Nepal.

At a later date all 75-mm (2.95-in) models of the French army were fitted with a 90-mm (3.54-in) gun which would fire canister, HE, HEAT and smoke projectiles, although more recently a APFSDS projectile has been developed that can penetrate a triple NATO tank target at an incidence of 60° at a range of 2000 m (2,190 yards). The 105-mm (4.13-in) gun model was designed specifically for the export market and had the heavier FL-12 turret, which is also fitted to the Austrian SK-105 light tank/tank destroyer.

The basic AMX-13 is powered by a petrol engine with an operative range of between 350 and 400 km (220 and 250 miles), but recently Creusot-Loire have replaced this with an American GM Detroit Diesel developing 280 hp (209 kW) and this gives an operational range of 500 km (310 miles) as well as reducing the risk of fire.



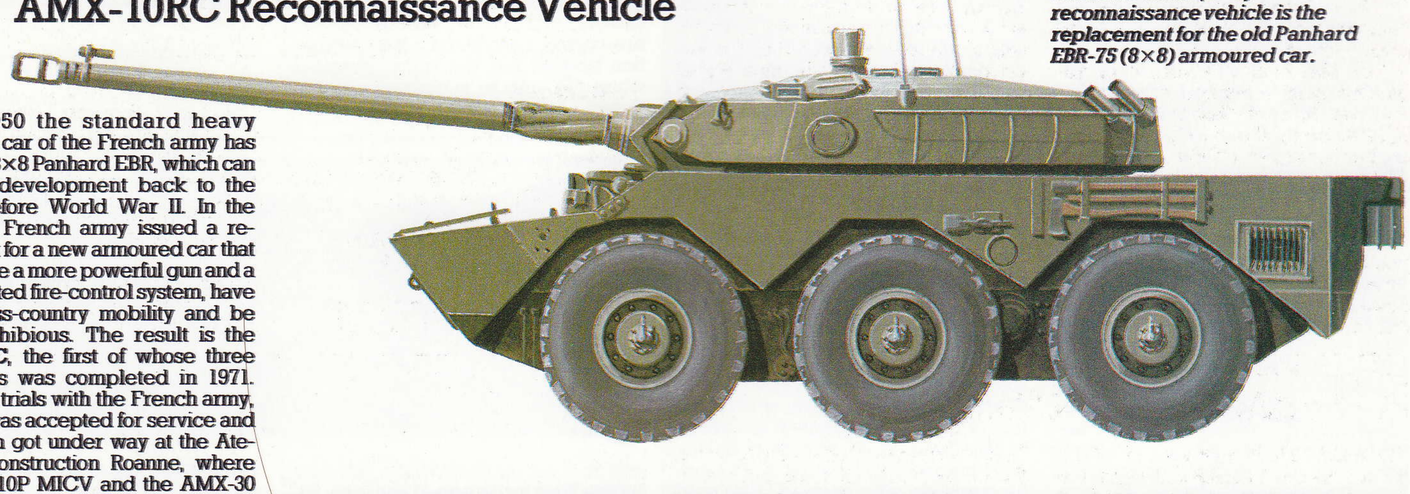
AMX-13 light tank fitted with an FL-10 two-man turret armed with a 75-mm (2.95-in) gun. Other versions were armed with 90-mm (3.54-in) or 105-mm (4.13-in) guns.

Specification

AMX-13 (90-mm gun)
Crew: 3
Weight: 15 tonnes
Dimensions: length (including gun) 6.36 m (20 ft 10⅓ in); length (hull) 4.88 m (16 ft 0 in); width 2.50 m (8 ft 2½ in); height 2.30 m (7 ft 6½ in)
Powerplant: one SOFAM 8Gxb 8-cylinder petrol engine developing 250 hp (186 kW)
Performance: maximum road speed 60 km/h (37 mph); maximum range 350-400 km (220-250 miles); fording 0.60 m (1 ft 11⅔ in); gradient 60%; vertical obstacle 0.65 m (2 ft 1⅔ in); trench 1.60 m (5 ft 3 in)

FRANCE

AMX-10RC Reconnaissance Vehicle



The AMX-10RC (6×6) reconnaissance vehicle is the replacement for the old Panhard EBR-75 (8×8) armoured car.

Since 1950 the standard heavy armoured car of the French army has been the 8×8 Panhard EBR, which can trace its development back to the period before World War II. In the 1960s the French army issued a requirement for a new armoured car that would have a more powerful gun and a sophisticated fire-control system, have good cross-country mobility and be fully amphibious. The result is the **AMX-10RC**, the first of whose three prototypes was completed in 1971. Following trials with the French army, the type was accepted for service and production got under way at the Atelier de Construction Roanne, where the AMX-10P MICV and the AMX-30 MBT family are produced. The first French army units were issued with the vehicle in 1979.

The AMX-10RC has two major drawbacks: firstly, it is more expensive than some MBTs and, secondly, it is very sophisticated. For this reason the French army has trimmed back its original requirements and is now looking at cheaper alternatives.

The hull and turret of the AMX-10RC are of all-welded aluminium construction, with the driver seated at the front left, the turret in centre and engine, and transmission at the rear. The 6×6 suspension is unusual in that the driver can adjust its ground clearance to suit the type of ground being crossed and even tilt it from side to side. For example, when travelling on roads the ground clearance is 330 mm (13 in), while for cross-country travel it is 470 mm (18½ in). Many of the automotive components, including the engine and transmission, are identical with those of the AMX-10P tracked MICV; and like the MICV the wheeled AMX-10RC is also skid-steered.

The vehicle is fully amphibious, being propelled in the water by two waterjets at the rear of the hull. Designed in the UK but manufactured in France under licence, this propulsion produces a maximum water speed of 7.2 km/h (4.5 mph). Before the vehicle enters the water a trim vane is erected at the front of the hull and the bilge pumps are switched on.

The commander and gunner are seated on the right on the turret, with the loader on the left. The main armament comprises a 105-mm (4.13-in) gun with an elevation of +20° and a depression of −8°; turret traverse is 360°. A 7.62-mm machine-gun is mounted co-axial with the main armament. Totals of 40 105-mm (4.13-in) and 4,000 7.62-mm rounds are carried. Two electrically-operated smoke dischargers are mounted on each side of the turret rear and fire forwards.

The fire-control system is the most sophisticated of its type installed in any vehicle of this class, and includes a laser rangefinder, a computer and a low-light TV system with a screen for both the commander and driver. This fire-control system enables stationary and moving targets to be engaged by day and night.

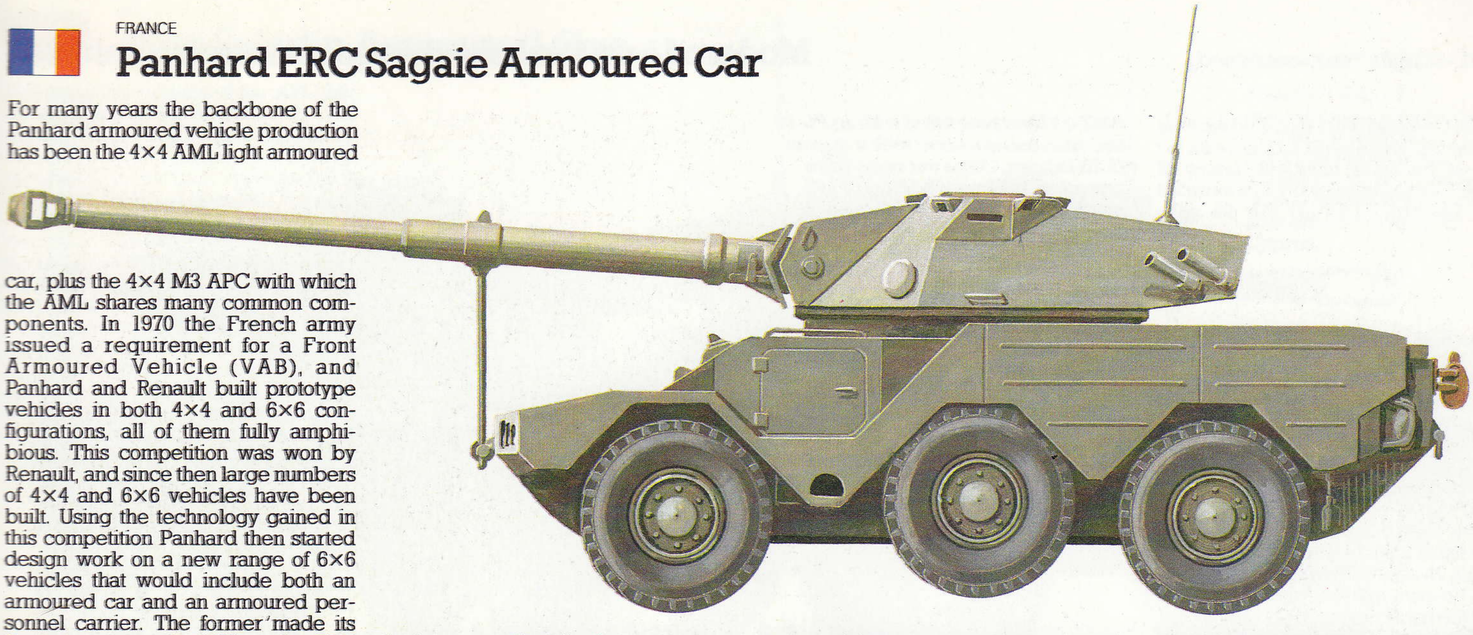
At present, two types of main-armament ammunition can be fired, namely HEAT and HE. The former has a muzzle velocity of 1120 m (3,675 ft) per second and will penetrate 350 mm (13.78 in) of armour at an incidence of 0° or 150 mm (5.91 in) of armour at an incidence of 60°. The HEAT round is ineffective against the new generations of armour, however, and for this reason an APFSDS projectile is now being developed.

Specification

Crew: 4
Weight: 15.8 tonnes
Dimensions: length (gun forward) 9.15 m (30 ft 0¼ in); length (hull) 6.35 m (20 ft 10 in); width 2.95 m (9 ft 8 in); height 2.68 m (8 ft 9½ in)
Powerplant: one 8-cylinder diesel developing 260 hp (194 kW)
Performance: maximum road speed 85 km/h (53 mph); maximum range 800 km (500 miles); fording amphibious; gradient 60%; vertical obstacle 0.70 m (2 ft 3¼ in); trench 1.15 m (3 ft 9 in)

FRANCE

Panhard ERC Sagaie Armoured Car



The Panhard ERC Sagaie armoured car is fitted with a GIAT TS-90 turret, armed with a 90-mm (3.54-in) gun.

For many years the backbone of the Panhard armoured vehicle production has been the 4×4 AML light armoured car, plus the 4×4 M3 APC with which the AML shares many common components. In 1970 the French army issued a requirement for a Front Armoured Vehicle (VAB), and Panhard and Renault built prototype vehicles in both 4×4 and 6×6 configurations, all of them fully amphibious. This competition was won by Renault, and since then large numbers of 4×4 and 6×6 vehicles have been built. Using the technology gained in this competition Panhard then started design work on a new range of 6×6 vehicles that would include both an armoured car and an armoured personnel carrier. The former made its first appearance in 1977 as the **ERC** (**Engin de Reconnaissance Canon**, or cannon-armed reconnaissance machine), while the APC is known as the **VCR** (**Véhicule de Combat à Roues**, or wheeled combat vehicle). Production commenced in 1979 and the ERC is now in service with, or has been ordered by Argentina (Marines), France, Iraq, Ivory Coast, Niger and Mexico.

The vehicle can be fitted with a wide range of turrets on the same basic chassis. The driver is seated at the front, the turret is in the centre, and the engine and transmission are at the rear. All six road wheels are powered; power-assisted steering is provided on the front two wheels. An unusual feature of the ERC is that the centre pair of wheels can be raised off the ground for road travel and lowered again for cross-country travel. The basic vehicle is fully amphibious, being propelled in the water at a speed of 4.5 km/h (2.8 mph) by its wheels, or by two optional waterjets at a speed of 9.5 km/h (5.9 mph). Before the vehicle enters the water a trim vane is erected at the front of the hull and two schnorkels are erected at the rear.

The basic vehicle can be fitted with a wide range of turrets including the GIAT TS-90, Hispano-Suiza Lynx 90, Hispano Suiza 60-20 Serval and EMC 81-mm mortar turrets, and a two-man turret with twin 20-mm or 25-mm cannon for use in the anti-aircraft role is also available.

The model selected by the French army (for use by its rapid intervention force) is fitted with the GIAT TS-90 turret and called the **ERC-90 F4 Sagaie.** This is armed with the long-barrelled 90-mm (3.54-in) gun with an elevation of +15° and a depression of −8°. The gun can fire the following types of fixed ammunition: canister, HE, HEAT, smoke and APFSDS. The last has a muzzle velocity of 1350 m (4,430 ft) per second and will penetrate 120 mm (4.72 in) of armour at an incidence of 60°. A 7.62-mm machine-gun is mounted co-axial with the main armament, and two electrically-operated smoke-dischargers are mounted on each side of the turret. Twenty rounds of 90-mm (3.54-in) and 2,000 rounds of 7.62-mm machine-gun ammunition are carried.

Optional equipment includes an air-conditioning system, additional ammunition stowage, laser rangefinder, passive night-vision equipment, NBC system, anti-aircraft machine-gun, additional elevation of the 90-mm (3.54-in) gun to +35°, various types of fire-control system and a land navigation system, the last being essential when the vehicle is operating in the desert.

Specification

Crew: 3
Weight: 7.65 tonnes
Dimensions: length (including gun) 7.693 m (25 ft 2¾ in); length (hull) 5.083 m (16 ft 8 in); width 2.495 m (8 ft 2¼ in); height 2.254 m (7 ft 4¾ in)
Powerplant: one Peugeot V-6 petrol engine developing 155 hp (116 kW)
Performance: maximum road speed 100 km/h (62 mph); maximum range 800 km (500 miles); fording amphibious; gradient 60%; vertical obstacle 0.80 m (2 ft 7½ in); trench 1.10 m (3 ft 7½ in)

FRANCE

Panhard AML-90 Armoured Car

The AML-90 has been one of the most successful wheeled AFVs in the post-war era, with over 4000 being built in France and South Africa. This model has a 90-mm (3.54-in) gun.

The French army used large numbers of British-built 4×4 Daimler Ferret scout cars in North Africa in the 1950s, and decided to procure a similar vehicle but with a wider range of armament installations. After evaluation of prototype vehicles, the design from Panhard was selected. Production commenced in 1960 under the designation **AML** (**Automitrailleuse Légère**, or light armoured car), and since then well over 4,000 vehicles have been built in several variants, with production continuing to this day for export. The type is also built in South Africa by Sandock Austral for the South African army, which calls the type the **Eland.** The AML, which is in service with well over 30 countries, shares 95 per cent of its automotive components with the Panhard M3 armoured personnel carrier, and many countries operate fleets of M3s and AMLs with the obvious financial, logistical and training advantages.

The layout of all variants is similar, with the driver at the front, the two-man turret in the centre (with an entry door in each side of the hull), and the engine and transmission at the rear.

One of the most common models is the **AML-90,** the latest version of this being called the **Lynx 90.** This has a two-man turret designed and built by Hispano-Suiza and armed with a GIAT 90-mm (3.54-in) DEFA gun, a 7.62-mm co-axial machine-gun and a 7.62-mm anti-aircraft machine-gun. The 90-mm (3.54-mm) gun can fire a wide range of fixed ammunition, including HEAT, HE, smoke and canister. The HEAT round will penetrate 320 mm (12.6 in) of armour at an incidence of 0° or 120 mm (4.72in) of armour at an incidence of 65°. Totals of 21 rounds of 90-mm (3.54-in) and 2,000 rounds of 7.62-mm ammunition are carried. Optional equipment for this turret includes passive night-vision equipment, powered controls and a laser rangefinder.

The **HE 60-7** turret has a 60-mm breech-loaded mortar and two 7.62-mm machine-guns, the **HE 60-12** turret a similar mortar and a 12.7-mm machine-gun, and the **HE 60-20** turret has the 60-mm mortar and a 20-mm cannon. The breech-loaded mortar is used both in the indirect and direct fire modes, and is very useful in guerrilla-type operations as it can be fired over hills and buildings.

One of the more recent models is the **HE 60-20 Serval** turret with a 60-mm long-barrel mortar mounted in the turret front with a 20-mm cannon and 7.62-mm machine-gun mounted externally at the turret rear. For the export market an anti-aircraft model of the AML was developed fitted with a two-man **SAMM S530** turret armed with twin 20-mm cannon, each with 300 rounds of ready-use ammunition. Turret traverse and weapon elevation is powered so enabling aircraft and helicopters to be engaged successfully.

More recently, scout car versions of the AML have been developed that are fitted with various combinations of 7.62-mm and 12.7-mm machine-guns on pintle mounts or in turrets. These have a lower profile than the 90-mm (3.54-in) gun models, are lighter, much cheaper and well suited for the light reconnaissance role.

As usual a wide range of optional equipment can be fitted, including passive night-vision equipment, an air-conditioning system and a complete NBC system. An amphibious kit was developed, but as far as is known this was not produced in quantity.

Specification

Crew: 3
Weight: 5.5 tonnes
Dimensions: length (including gun) 5.11 m (16 ft 9¼ in); length (hull) 3.79 m (12 ft 5¼ in); width 1.97 m (6 ft 5½ in); height 2.07 m (6 ft 9½ in)
Powerplant: one Panhard 4-cylinder petrol engine developing 90 hp (67 kW)
Performance: maximum road speed 90 km/h (56 mph); maximum range 600 km (375 miles); fording amphibious; gradient 60%; vertical obstacle 0.30 m (1 ft 0 in); trench 0.80 m (2 ft 7½ in) with one channel

USSR

BRDM-1 Amphibious Scout Car

In the period immediately after World War II the BA-64 light armoured car (developed in 1942) remained the standard reconnaissance vehicle of its type in the Soviet army. From the late 1950s this was rapidly replaced by the 4×4 **BRDM-1** amphibious scout car, which was also used by the Warsaw Pact countries and exported to a number of countries in Africa and the Middle East. It was not used by Hungary, however, as that country decided to build a similar vehicle called the **FUG** (or **OT-65**), which is very similar in appearance but has the engine at the front instead of the rear. The FUG is also used by Czechoslovakia and Poland. In most Soviet units the BRDM-1 has now been replaced by the much improved BRDM-2 vehicle.

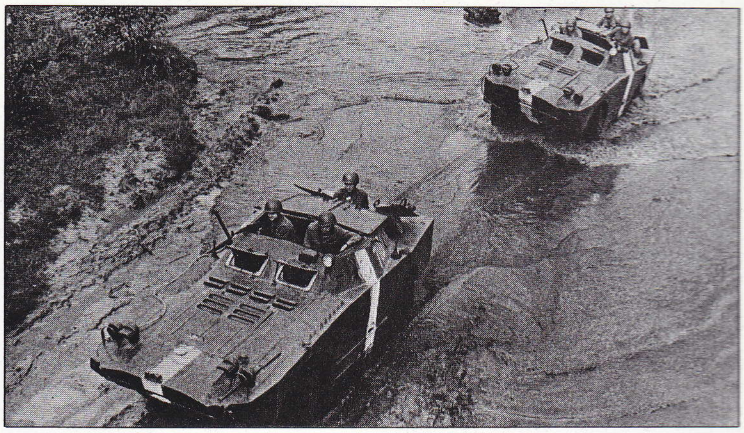
The layout of the BRDM-1 is similar to that of a car with the engine and transmission at the front, driver and commander in the centre and a small crew compartment at the rear. The only means of entry are by hatches in the roof and rear of the crew compartment. Between the front and rear wheels on each side of the hull are two belly wheels, which are powered and lowered to the ground by the driver when the vehicle is crossing ditches or rough terrain. The feature was also adopted by the later BRDM-2. A central tyre pressure regulation system is standard, and this allows the driver to inflate or deflate the tyres according to the conditions: for example, the tyres are deflated for sand crossings, while on roads they are fully inflated. The BRDM-1 is fully amphibious, being propelled in the water at a speed of 9 km/h (5.6 mph) by a single waterjet at the rear of the hull. Before the vehicle enters the water, a trim vane is erected at the front of the hull and the bilge pumps are switched on.

The BRDM-1 is normally armed with a single 7.62-mm SGMB machine-gun mounted on the forward part of the roof with a total traverse of 90° (45° left and right) elevation being from −6° to +23.5°. A total of 1,070 rounds of ammunition is carried. Some vehicles have been observed with a similar weapon at the rear and a 12.7-mm DShKM machine-gun at the front.

The **BRDM-U** command vehicle has additional communications equipment, while the **BRDM-rkh** radiological/chemical reconnaissance vehicle is used to mark lines through contaminated areas. Mounted at the rear of the hull are two racks that contain the marking poles and pennants; when required, these racks swing through 90° over the rear of the vehicle so allowing the poles with their attached pennants to be put into the ground.

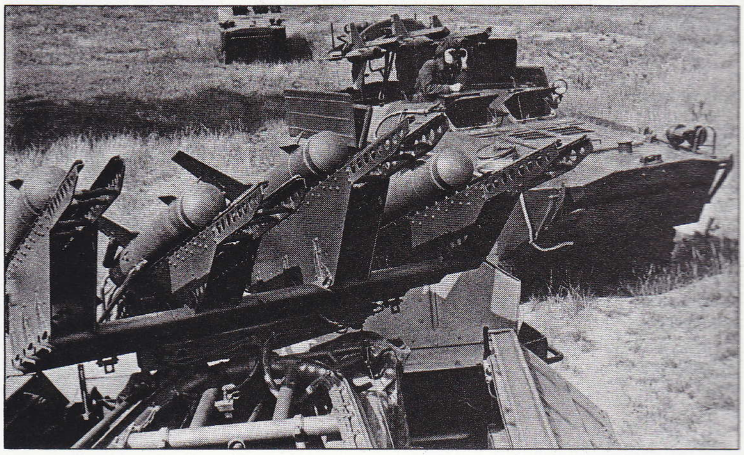
There are also three versions of the BRDM-1 fitted with ATGWs. The first model has three AT-1 'Snapper' ATGWs with a range of 2500 (2,735 yards). The missiles on their launcher arms are carried under armour protection and raised above the roof of the vehicle for launching. The second model is similar but has four 'Swatter' missiles with a range of 3000 m (3,280 yards); for some reason this mounting was not exported outside the Warsaw Pact. The last model to enter service has six 'Sagger' ATGWs with a maximum range of 3000 m (3,280 yards); additional missiles are carried in the hull. This wire-guided missile, which proved to be highly effective in the 1973 Middle East war, can be launched from within the vehicle or up to 80 m (87.5 yards) away from it with the aid of a separation sight.

Specification
Crew: 5
Weight: 5.6 tonnes
Dimensions: length 5.70 m (18 ft 8½ in); width 2.25 m (7 ft 4⅔ in); height 1.90 m (6 ft 2¾ in)
Powerplant: one 6-cylinder petrol engine developing 90 hp (67 kW)
Performance: maximum road speed 80 km/h (50 mph); maximum range 500 km (310 miles); fording amphibious; gradient 60%; vertical obstacle 0.40 m (1 ft 3¾ in); trench 1.22 m (4 ft 0 in)



Above: Soviet BRDM-1 (4×4) amphibious scout cars, with roof hatches open, ford a stream. The vehicle is propelled in the water by a single waterjet at the rear of the hull, which gives it a maximum speed of 9 km/h (5.6 mph). When travelling across rough country belly wheels are lowered between the front and rear axles.

Below: A Soviet BRDM-1 with four AT-2 'Swatter' ATGWs in the foreground, and a BRDM-1 with three AT-1 'Snappers' in the background. The 'Snapper' has a maximum range of 2500 (8202 ft), while the 'Swatter' has a range of 3000 (9842 ft). Both missiles have a HEAT (High Explosive Anti-Tank) warhead.



USSR

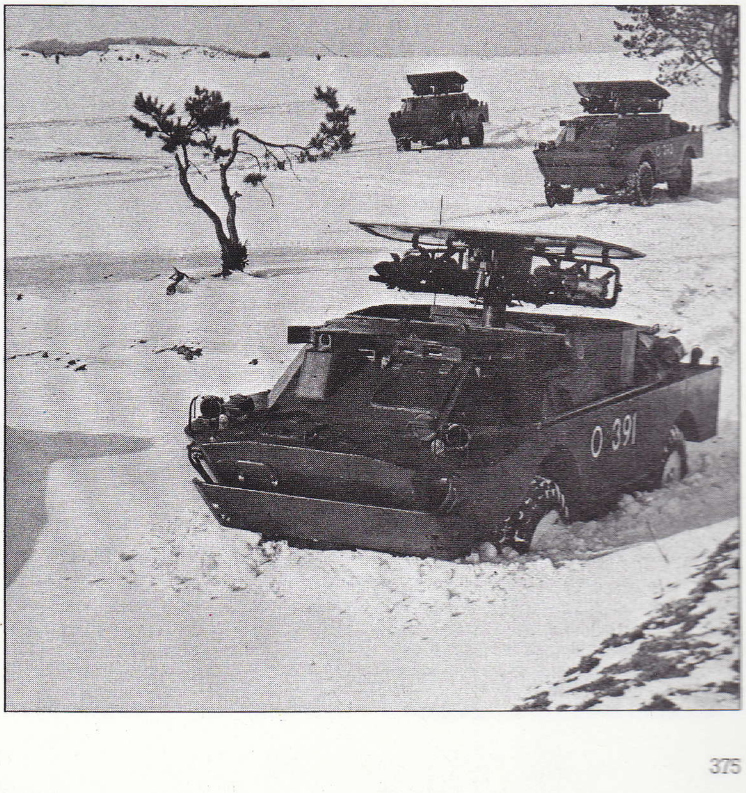
BRDM-2 Amphibious Scout Car

The 4×4 **BRDM-2** amphibious scout car was developed as the successor to the earlier **BRDM-1**, and was first seen in public in 1966, although it entered service some years before that date. The most significant improvements of the BRDM-2 over the earlier vehicle can be summarized as better vision for the commander and driver, more powerful armament mounted in a fully enclosed turret, a more powerful engine that gives higher road and water speeds, an NBC system, and longer operational range.

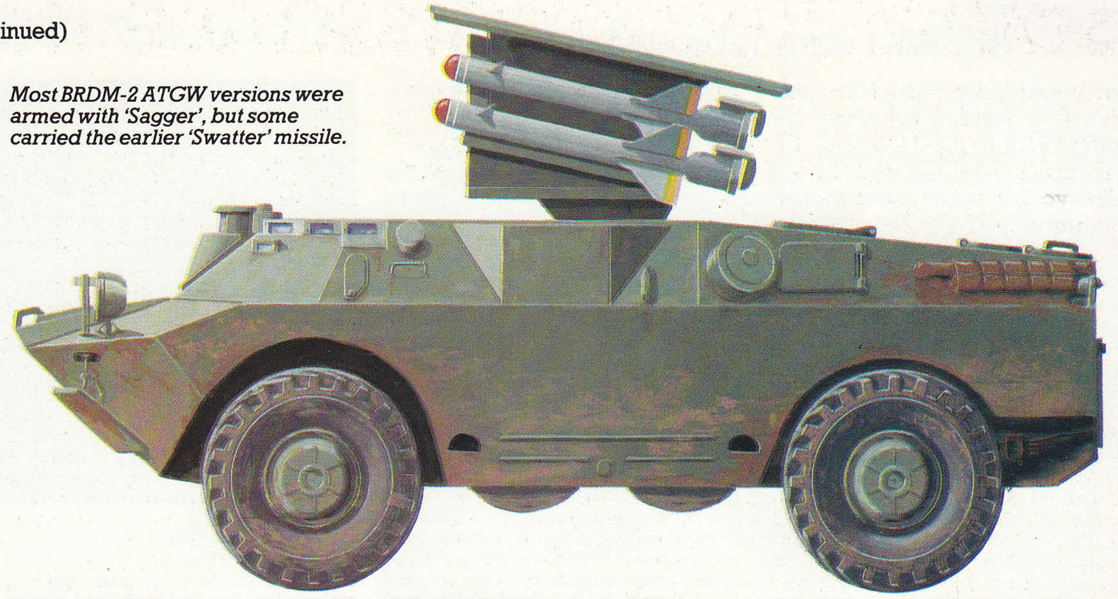
The BRDM-2 has now replaced the BRDM-1 in most Soviet units, and is also in service with almost 40 countries all over the world, seeing action in such places as Angola, Egypt, Iraq, Syria and Vietnam.

The all-welded steel hull of the BRDM-2 is only 7 mm (0.275 in) thick, apart from the nose plate which is 14 mm (0.55 in) thick, and the underside of the belly which is only 2 or 3 mm (0.08 or 0.12 in) thick and makes the vehicle very vulnerable to mine explosions. The driver and commander are seated at the front of the vehicle. Each has to his front a windscreen that is covered in combat by an armoured hatch. Over each of their positions is a single-piece hatch cover that opens vertically; these are the only means of entry into the vehicle for the four-man crew. The turret, which has no roof hatch, is the same as that fitted to the Soviet 8×8 BTR-60PB and Czech 8×8 OT-64 Model 2A armoured personnel carriers, and is armed with a 14.5-mm KPV heavy machine-gun and a co-axial 7.62-mm PKT machine-gun. The weapons have an elevation of +30° and a depression of −5°, and turret traverse is 360°. Totals of 500 rounds of 14.5-mm and 2,000 rounds of 7.62-mm ammunition are carried. The KPV is a highly effective weapon and can fire an API projectile that will penetrate 32 mm (1.26 in) of armour at a range of 500 m (545 yards).

A BRDM-2 ATGW carrier, with a launcher for six AT-3 'Sagger' ATGWs in the raised position, ready for firing. This model was used successfully by the Egyptian army in the 1973 Middle East campaign. The missiles can be launched from or away from the vehicle.



BRDM-2 Amphibious Scout Car (continued)



Most BRDM-2 ATGW versions were armed with 'Sagger', but some carried the earlier 'Swatter' missile.

The engine and transmission are at the rear of the vehicle. Like the earlier BRDM-1 the BRDM-2 has two belly wheels that can be lowered to the ground on each side of the hull to enable ditches and rough country to be crossed with ease. The vehicle also has a central tyre pressure regulation system, infra-red night-vision equipment, an NBC system, radios, a navigation system and a winch mounted internally at the front of the hull.

The basic BRDM-2 chassis has formed the basis for a whole family of more specialized vehicles including the **BDRM-2-rkh** radiological/chemical reconnaissance vehicle and the BRDM-2U command vehicle, which does not have a turret.

The first ATGW model was armed with six 'Sagger' ATGWs with a range of 3000 m (3,280 yards), and this **BTR-40PB 'Sagger'** model was widely used by Egypt during the 1973 Middle East war. A version with 'Swatter' ATGWs is also in service, but the latest model is armed with five 'Spandrel' ATGWs in the ready-to-launch position on the hull top. These missiles, which operate in a similar manner to the Euromissile HOT, have a range of at least 4000 m (4,375 yards). The SA-9 'Gaskin' surface-to-air missile also uses the BRDM-2 chassis and has four missiles in the ready-to-launch position; each Soviet armoured and motorized rifle division has 16 of these systems. The SA-9 has also been used in combat in the Middle East, most recently with the Syrian forces during the Israeli invasion of the Lebanon in the summer of 1982.

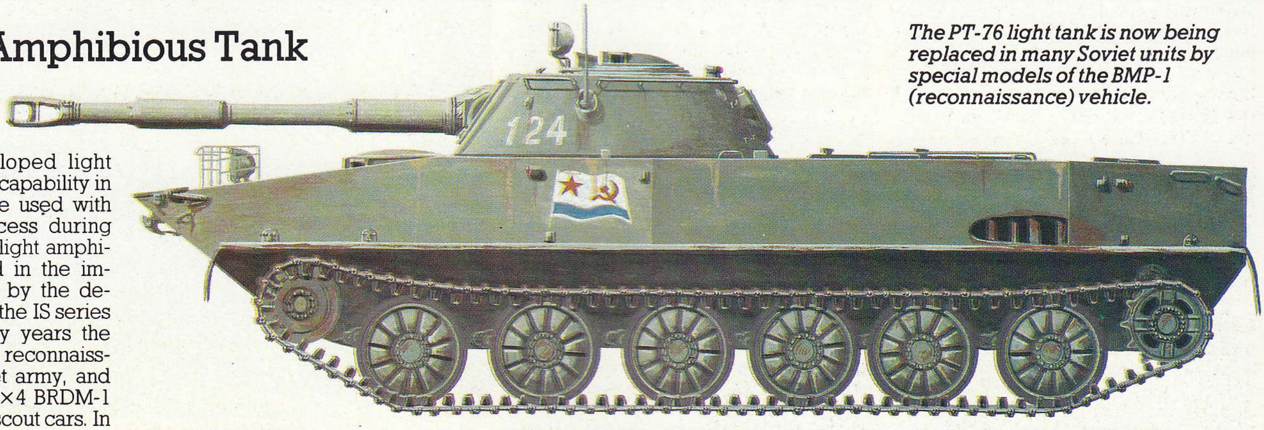
Specification

Crew: 4
Weight: 7 tonnes
Dimensions: length 5.75 m (18 ft 10⅓ in); width 2.35 m (7 ft 8½ in); height 2.31 m (7 ft 7 in)
Powerplant: one V-8 petrol engine developing 140 hp (104 kW)
Performance: maximum road speed 100 km/h (62 mph); maximum range 750 km (465 miles); fording amphibious; gradient 60%; vertical obstacle 0.40 m (1 ft 3¾ in); trench 1.25 m (4 ft 1 in)

USSR

PT-76 Amphibious Tank

The PT-76 light tank is now being replaced in many Soviet units by special models of the BMP-1 (reconnaissance) vehicle.



The Soviet Union developed light tanks with an amphibious capability in the 1920s and these were used with varying degrees of success during World War II. The **PT-76** light amphibious tank was designed in the immediate post-war period by the design team responsible for the IS series of heavy tanks. For many years the PT-76 was the standard reconnaissance vehicle of the Soviet army, and was used alongside the 4×4 BRDM-1 and BRDM-2 amphibious scout cars. In many Soviet units the type has now been replaced by MBTs such as the T-62, T-64 and T-72. Although production of the PT-76 was completed many years ago, the tank is still used by at least 25 countries. It has seen action with the Indian army during the conflict with Pakistan, with the Egyptian army during the 1967 Middle East war, with the North Vietnamese army during the Vietnamese war, and more recently with the Angolan army during operations in South West Africa.

The chassis of the PT-76 was subsequently used for a large number of other vehicles including the **BTR-50** amphibious APC and the launcher for the FROG (Free Rocket Over Ground) missile system.

The hull of the PT-76 is of all-welded steel construction and provides the crew with protection from small arms fire only: any additional armour would have increased the type's weight to the point that it would not have been amphibious. The driver is seated at the front in the centre, the two-man turret is in the centre of the vehicle, and the engine and transmission are at the rear. The torsion-bar suspension consists of six single road wheels, with the drive sprocket at the rear and the idler at the front; there are no track-return rollers.

The main armament consists of a 76-mm (3-in) D-56T gun with an elevation of +30° and a depression of −4°, turret traverse being 360°. A 7.62-mm SGMT machine-gun is mounted co-axial with the main armament, and more recently some vehicles have been observed fitted with a 12.7-mm DShKM anti-aircraft machine-gun on the turret roof. Totals of 40 rounds of 76-mm (3-in) and 1,000 rounds of 7.62-mm ammunition are carried. Several types of fixed ammunition can be fired, namely AP-T, API-T, HE-FRAG, HEAT and HVAP-T. The HEAT projectile can penetrate 120 mm (4.72 in) of armour at 0°, while the HVAP-T projectile can punch through 58 mm (2.28 in) of armour at 1000 m (1,095 yards) or 92 mm (3.62 in) at 500 m (545 yards). The lack of armour penetration against more recent tanks must have been one of the reasons why the PT-76 has been phased out of service with many Soviet units.

The most useful feature of the PT-76 is its amphibious capability, which is the reason why the type has also been used by the Polish and Soviet Marines. In the water the tank is powered by two waterjets at a maximum speed of 10 km/h (6.2 mph). The only preparation required before entering the water is the raising of the trim vane at the front of the hull, the activation of the bilge pumps and the engagement of the waterjets. Maximum waterborne range is about 65 km (40 miles). To enable the driver to see forwards when afloat his centre periscope can be raised above the hatch cover. Standard equipment includes infra-red lights, but no NBC system is installed.

Specification

Crew: 3
Weight: 14 tonnes
Dimensions: length (with armament) 7.625 m (25 ft 0¼ in); length (hull) 6.91 m (22 ft 8 in); width 3.14 m (10 ft 3⅔ in); height 2.255 m (7 ft 4¾ in)
Powerplant: one V-6 6-cylinder diesel developing 240 hp (179 kW)
Performance: maximum road speed 44 km/h (27 mph); maximum range 260 km (160 miles); fording amphibious; gradient 60%; vertical obstacle 1.10 m (3 ft 7⅓ in); trench 2.80 m (9 ft 2 in)

PT-76 Model 2 light amphibious tanks come ashore from landing craft of the Red Banner Northern Fleet. Note the turret hatch cover open and the trim vane at the front in the raised position. Main armament comprises a 76-mm (3-in) gun and 7.62-mm co-axial machine gun.

Soviet Reconnaissance Battalion

In Soviet tactical doctrine, the 'Meeting Engagement' between two fast-moving columns is potentially one of the decisive combat actions. Where the enemy is fast-moving, a rapid and accurate assessment of his fighting potential is essential, and the work of reconnaissance forces in setting up a battle-winning position becomes of prime importance.

Each Soviet tank and motorized rifle division has one reconnaissance battalion, which in recent years has been equipped with MBTs in place of the PT-76 light amphibious tank, and has also received additional communications equipment. The reconnaissance battalion has a strength of 340 officers and men, and is organized into a headquarters and service company (70 officers and men), two BMP reconnaissance companies (each with 55 officers and men), one scout car reconnaissance company (80 officers and men) and one radio/radar reconnaissance company (80 officers and men).

The battalion's full authorized equipment consists of 13 RPG-16 anti-tank grenade-launchers, 19 5.45-mm RPK-74 light machine-guns, one BRDM-2 armoured command vehicle, two BTR-60PA armoured command vehicles, three BMP armoured command vehicles, 12 BMP-1 armoured infantry combat vehicles, six T-64 or T-72 tanks (depending on the equipment of the parent division), 12 BRDM-2 amphibious scout cars, five 4×4 UAZ-69/469 light vehicles, two 4×4 GAZ-66 trucks, five 6×6 ZIL trucks, four 6×6 Ural-375 trucks, four GAZ command vehicles, 13 GAZ vehicles with van type bodies for use in the radio/radar reconnaissance role, two 6×6 ZIL maintenance vans, six ZIL vans, two ZIL/Ural or KrAZ tanker trucks, one ambulance, two POL (petrol, oil and lubricants) trailers, two trailer generators, one water generator, four kitchen trailers, four BRDM-2 chemical reconnaissance vehicles, three man-portable battlefield surveillance radars, nine signals intelligence sets and three direction-finding radars. In addition there are some 70 radios, one radio-relay set, five warning receivers, six radio telegraph units and three HF/VHF/UHF radio direction-finding equipments. When this is compared with the equivalent available to an American division, it is quickly apparent that the Soviet divisional commander does not have any dedicated reconnaissance helicopters within the reconnaissance battalion. Some divisions are now receiving a helicopter squadron that consists of a squadron headquarters, two Mil Mi-8 'Hip' flights, two Mi-24 'Hind' flights, two Mi-2 'Hoplite' flights plus signals, aircraft maintenance and armaments sections; the total strength of the helicopter squadron is believed to be about 200 officers and men.

In addition there are reconnaissance elements available at regimental level: each motorized rifle regiment and each tank regiment has a reconnaissance company with an authorized strength of 55 officers and men. This is organized in a headquarters company, a BMP scout platoon, a scout car platoon and a motorcycle section. Its equipment consists of four RPG-16 anti-tank grenade-launchers, three 5.45-mm RPK-74 light machine-guns, one reconnaissance version of the BMP, three normal BMPs, four BRDM-2s, three motorcycles and one man-portable battlefield surveillance radar set plus 12 radios and a single warning receiver.

The exact role of the reconnaissance battalion depends on the operation being conducted, but for the purpose of this brief analysis the 'meeting engagement' is described as this has a major role in Soviet tactical doctrine, and is regarded by the Soviets as one of the most decisive combat actions.

A meeting engagement is combat between two opposing columns advancing at speed towards each other, and can occur at the outbreak of hostilities when the enemy has been surprised and is attempting to deploy to forward areas (as, for example, the British Army of the Rhine will have to deploy forward in time of war); during a breakthrough when the enemy's tactical reserve is deploying for a counterattack or to plug a gap; in the depth of the defence area where the enemy is deploying to blocking positions; during an enemy withdrawal when he is outflanked; and finally during defensive operations when the enemy axes of advance are identified or when a counterattack is launched.

In most of these situations the Soviet commander anticipates a meeting engagement, and so advances in a predetermined march formation, identifies the point of contact and issues tentative orders for the engagement. Where possible the Soviets would assault the enemy from the flank while the latter is still in march formation or while beginning to deploy into combat formation, so causing the maximum possible confusion.

The meeting engagement can be conducted at battalion, regimental or divisional level, the Soviet march formation consisting of the advanced detachments, advance guard, main body and rear security with flank security on each side.

The advance, flank and rear security detachments provide the reconnaissance and march security for the main body, and in the first of the two roles are free to manoeuvre.

A BRDM-2 (4×4) with five Spandrel ATGWs in the ready-to-launch position on parade in Red Square, Moscow. These missiles have a range of 3000 (9842 ft) and a HEAT warhead.

Soviet Reconnaissance Battalion

The primary tasks of the reconnaissance units are the detection and identification of terrain features or enemy resistance that may slow or deflect the advance of the main body, the clearance of the axis of advance, the protection of the flanks and rear, and the assurance of the main body's ability to manoeuvre. The exact composition of these elements must vary according to the threat and terrain. For example, if contact with several small enemy units is expected the reconnaissance elements are augmented by motorized rifle or tank elements. More difficult terrain would require larger allocations of engineer and traffic-control elements, while a nuclear environment would require a chemical-defence attachment. As has already been noted, some BRDM-2s are held at the reconnaissance battalion, while each tank and motorized rifle division also has a chemical-defence battalion that includes decontamination companies and a chemical reconnaissance platoon. Each division also has an engineer battalion with a full range of wet and dry bridging equipment. Moreover, if one particular flank is threatened a flank security guard equal in strength to the advanced guard may be employed.

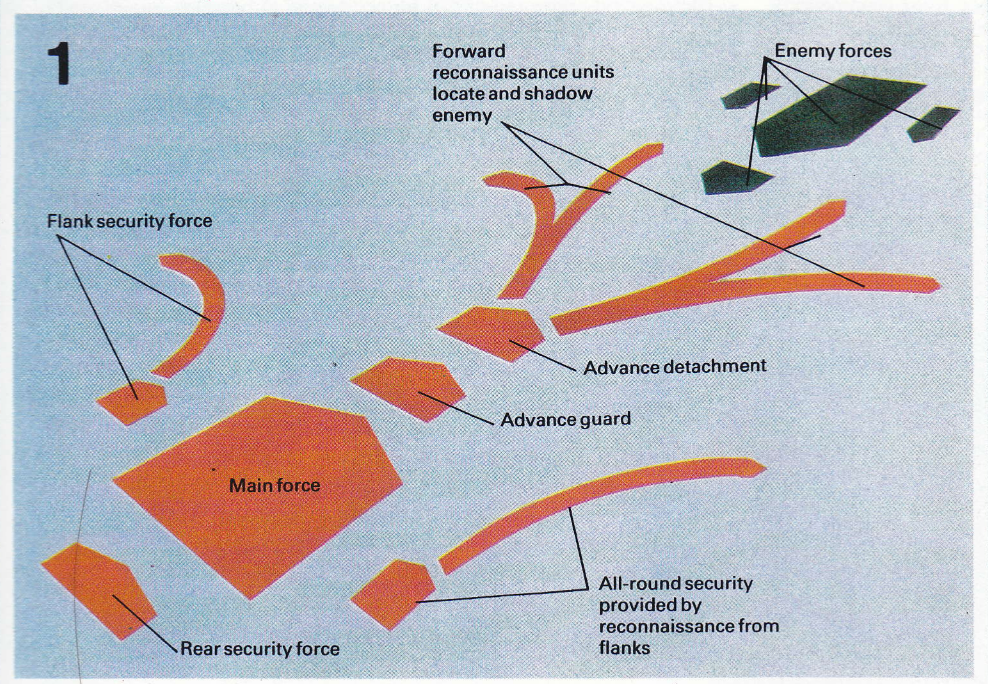
The meeting engagement is usually conducted in five stages: location of the enemy formation as it approaches, identification of the enemy formation as it approaches, decision to initiate a meeting engagement, engagement itself and conduct of actions after the engagement.

Reconnaissance reports are received from higher elements while the division reconnaissance battalion, or elements of the battalion (depending on the mission) operates in small parties up to 100 km (62 miles) ahead of the main body. Wherever possible these parties must try to avoid engagement but at the same time maintain contact and monitor the movement of the enemy forces as they approach the division. If the reconnaissance battalion is engaged in a major confrontation, it is unlikely that they will be reinforced or that air assets such as ground-attack aircraft will be allocated to its assistance. Regimental reconnaissance elements make contact with the enemy up to 50 km (31 miles) ahead of the main body. The time from initial contact (at a distance of 1000 km/62 miles) to a decision to initiate a meeting engagement (at 50 km/31 miles) is at least one hour, assuming that each force is averaging about 25 km/h (15.5 mph).

The decision to initiate a meeting engagement is normally made at one level and is then confirmed by the commander one rung higher up the command ladder. The decision itself is made on the march, the Soviets relying on surprise and speed rather than detailed planning and preparation to provide the required margin for success.

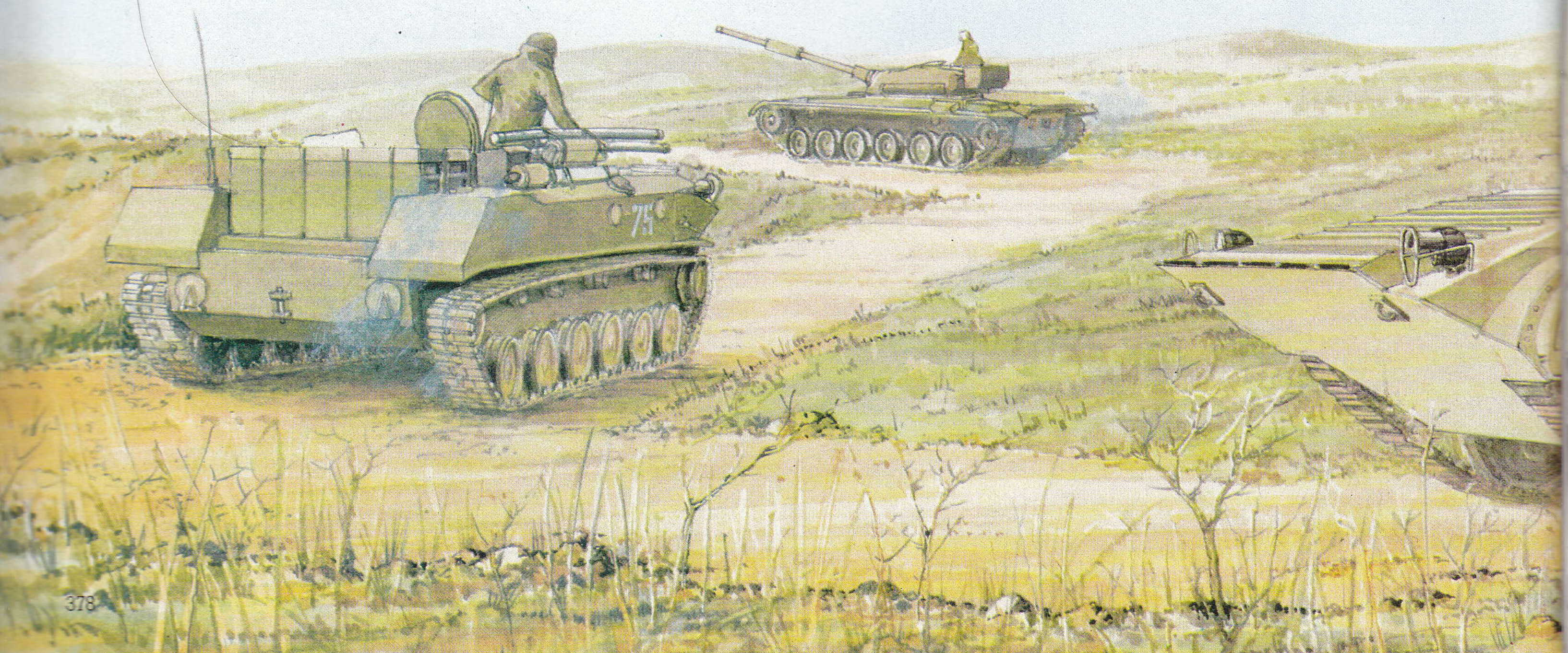
The point of contact of the meeting engagement is determined by the closeness of the opposing forces, their respective rates of movement, and the actual terrain. If possible suitable defensive ground in the path of the advancing enemy is selected to draw the attention of the enemy commander. When possible the assault is often launched from a flank on ground that restricts the manoeuvring capability of the enemy and facilitates an ambush. If the opposing forces are very close then an immediate (often frontal) assault is made to make

The scenario below depicts a typical Soviet reconnaissance unit operating ahead of a major armoured thrust. Its role is to identify the enemy's disposition and to report back to the units following.
Reconnaissance units are armed to defend themselves, not to seek engagement with the enemy.


1
Forward reconnaissance units locate and shadow enemy
Enemy forces
Flank security force
Advance detachment
Advance guard
Main force
Rear security force
All-round security provided by reconnaissance from flanks

1. 100 km ahead of the main body of the Soviet division, forward elements of the reconnaissance battalion meet an enemy column. Avoiding engagement, the makeup of the opposing column is communicated to the divisional commander.

Soviet reconnaissance patrols are made up from a mixture of vehicle types with differing capabilities. The T-72 tank seen leading the patrol provides some firepower against enemy reconnaissance units. The two combat vehicles following are a BMD Air portable carrier and a BMP-1 Infantry combat vehicle, capable of carrying eight infantrymen, extra communications gear, or extra spares and equipment. A BRDM-2 Scout car follows, with the patrol commander. While the BRDM is a wheeled vehicle it has good cross-country capability, enabling it to keep up with its tracked companions.



the maximum use of surprise, the Soviets having a belief that the decisive edge lies with the initiator. To prevent enemy counteraction, deployment is made at the maximum possible speed.

The objective is to assault the enemy's main body, to destroy or disorganize the unit, and then to mop up the pockets of resistance. Like most armies, the Soviet army believes that speed and shock action are of prime importance during such operations, and that the attacking force does not have to outnumber its opponents in order to achieve its objective.

When ordered to do so the advance guard will occupy a blocking position and commence artillery engagement of the main enemy force. The main body will then deploy to the selected assault position and strike the enemy main body which is advancing to support its vanguard. If possible, the distracted enemy formation is assaulted while advancing in columns or during manoeuvres in support of its engaged vanguard. A flank attack is only one of the options open to the Soviet commander as he may also decide to attack frontally, from the rear or from both flanks at once. In any case, the Soviets believe that in an engagement in which the attacker holds the initiative, he has a decisive advantage.

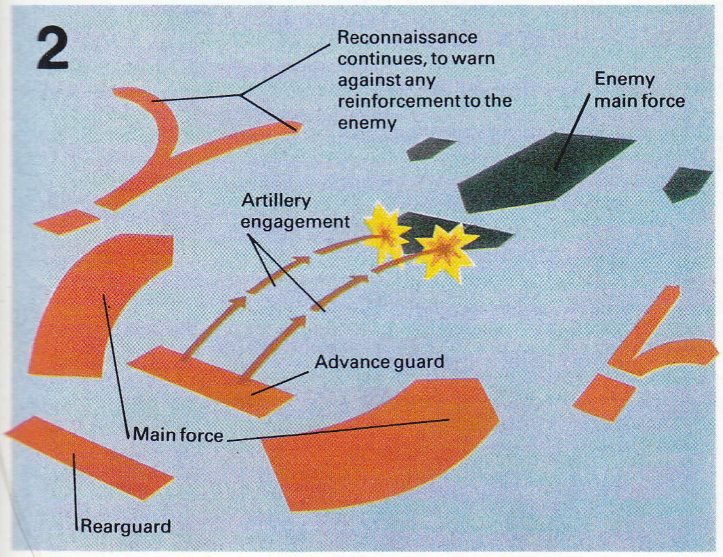
The meeting engagement ends when one of the opposing forces adopts a new tactic such as establishing a defensive position or withdrawing, but according to the tactical situation the Soviets would probably adopt one of three options: a deliberate attack, a pursuit or a withdrawal.

In normal offensive operations the mission of Soviet reconnaissance units is to obtain detailed information on the enemy by observation, manoeuvre and limited combat action in order to enable the tactical elements of the command to launch an attack under the best conditions. They also pinpoint the location of enemy nuclear weapon systems (for example, Lance and Pershing), strongpoints, areas of defence as well as the location of reserve forces and other units of interest.

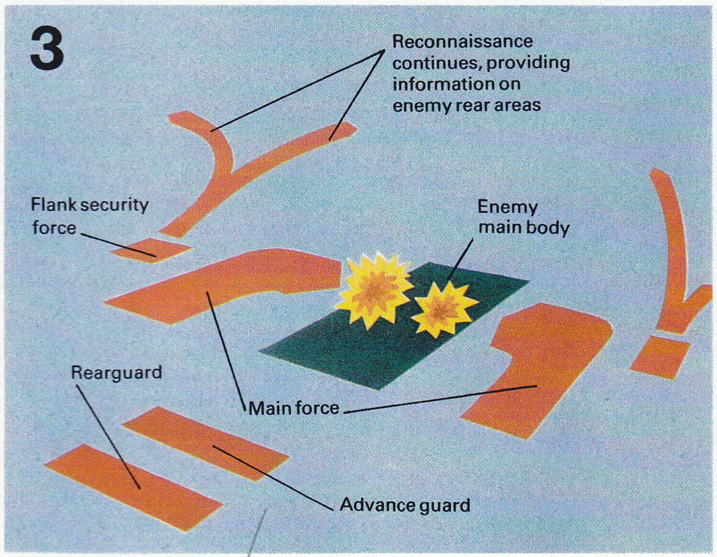
In addition to the reconnaissance battalions and companies mentioned briefly here, the other main means of reconnaissance are air reconnaissance, electronic intelligence, artillery observation, and troop observation and reconnaissance. In each case the location of nuclear delivery systems has the highest possible priority, and if any Soviet reconnaissance unit comes into contact with nuclear delivery systems it must attack them regardless of its primary mission. High priority is also given to the gathering of information on the combat effectiveness of enemy forces, the nature of enemy operations and intentions, and what protection is available against Soviet NBC attack.

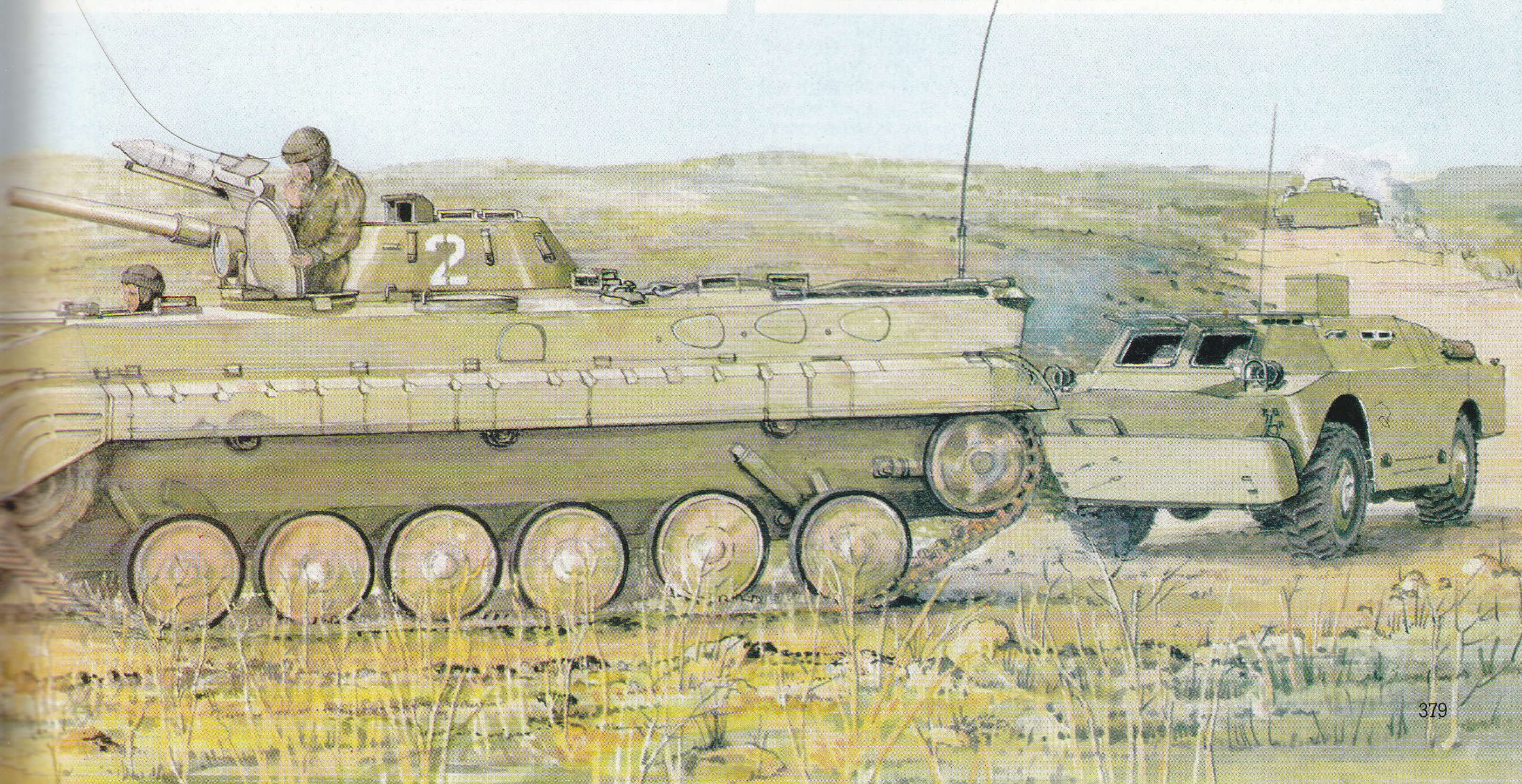
When ordinary ground and air reconnaissance activities do not provide the information required, then a reconnaissance-in-force operation will be made in an effort to get the information. The object of the reconnaissance-in-force is to force the enemy to expose his defence systems, but it is unlikely to be carried out to a depth of more than 2.5 km (1.55 miles). If it is believed that the reconnaissance-in-force will be a major success then it is possible that the divisional commander will decide to launch a major offensive.

2. By the time reconnaissance units at regimental level (about 50 km in advance of the division) make contact, the divisional commander will have decided what kind of engagement to try for. Using the divisional artillery to hold the forward elements of the opposing formation, the division will seek to outflank the enemy.


2
Reconnaissance continues, to warn against any reinforcement to the enemy
Enemy main force
Artillery engagement
Advance guard
Main force
Rearguard

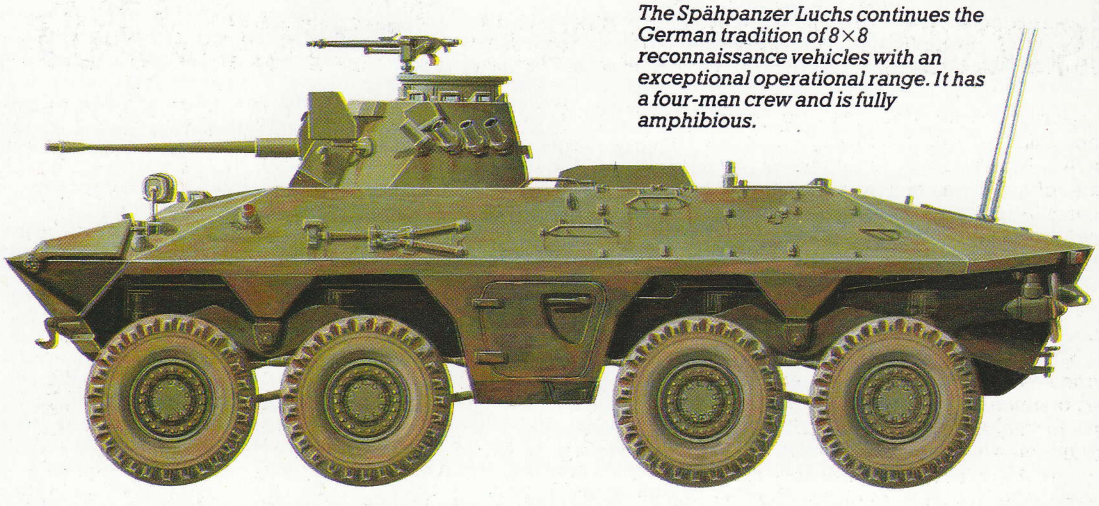
3. The oncoming force, having been persuaded by the artillery barrage to expect a frontal assault, should be taken by surprise by powerful strikes against the flanks. The reconnaissance forces have meanwhile penetrated deeper into the enemy's territory and continue to report on enemy deployment, strongpoints and missile sites.





WEST GERMANY

Spähpanzer 2 Luchs Reconnaissance Vehicle



The Spähpanzer Luchs continues the German tradition of 8×8 reconnaissance vehicles with an exceptional operational range. It has a four-man crew and is fully amphibious.

When the West German army was reformed in the 1950s it had insufficient time to have equipment designed to meet its own requirements, and it therefore had to take what was on offer from the American or European manufacturers. To meet its requirement for a reconnaissance vehicle it selected the French Hotchkiss carrier fitted with a turret armed with a Hispano-Suiza 20-mm cannon, this variant being designated the **SPz 11-2.** This suffered from a number of drawbacks as it was not amphibious and its petrol engine gave an operating range of only about 400 km (250 miles).

In the mid-1960s a complete family of 4×4, 6×6 and 8×8 trucks, 4×4 and 6×6 (later to become the Transportpanzer, or Fuchs) armoured amphibious load-carriers, and an 8×8 amphibious armoured reconnaissance vehicle were developed, all sharing many common automotive components that were in most cases already in production for a civilian application. Prototypes of the 8×8 amphibious armoured reconnaissance vehicle were designed and built by Daimler-Benz and a consortium of companies known as the Joint Project Office (JPO) in 1968, and in 1971 the Daimler-Benz model was selected for production. For a variety of reasons production was undertaken by Thyssen Henschel, which built a total of 408 vehicles called the **Spähpanzer 2 Luchs** for the West German army between 1975 and 1978. The Spz 2 was offered on the export market, but for most countries it proved too expensive.

The hull of the Luchs is of all-welded steel construction, with the front part of the turret and the hull providing protection against attacks from 20-mm projectiles and the remainder proof against small arms fire and shell splinters. The driver is at the front left, the two-man turret in the centre, the engine at the rear on the right side, and the co-driver, who also operates the radio, on the rear on the left side, seated facing the rear. In an emergency the rear driver can quickly take control and drive the vehicle out of trouble. The Luchs has a maximum speed of 90 km/h (56 mph) in both directions. It also has an exceptionally large operating range of 800 km (500 miles).

The Rheinmetall TS-7 turret is armed with a dual-feed Rheinmetall MK 20 Rh 202 cannon, for which 375 rounds of ammunition are carried in the turret. Turret traverse and weapon elevation (from −15° to +69°) is powered, turret traverse being 360°. A 7.62-mm MG3 machine-gun is mounted on the turret roof for anti-aircraft defence and 1,000 rounds of ready-use ammunition are provided for this weapon. On each side of the turret is a bank of four electrically-operated smoke-dischargers, all firing forward.

The driver has powered steering to reduce fatigue when driving over long distances or across rough country, and he can select either steering on the front four wheels or on all eight wheels; the latter turning radius is only 11.5 m (37 ft 8¾ in).

The Luchs is fully amphibious, being propelled in the water at a speed of 9 km/h (5.6 mph) by two steerable propellers mounted under the hull at the rear, one on each side. Before the vehicle enters the water the trim vane is erected at the front of the hull and the three bilge pumps are switched on.

The Luchs also has an NBC system, and the original range of infra-red night-vision equipment is now being replaced by the passive type. Standard equipment includes a pre-heater for the batteries, engine and transmission oil and cooling liquid, all essential for winter operations in Germany.

Specification

Crew: 4
Weight: 19.5 tonnes
Dimensions: length 7.743 m (25 ft 4¾ in); width 2.98 m (9 ft 9⅓ in); height (including AA MG) 2.905 m (9 ft 6⅓ in)
Powerplant: one 10-cylinder diesel developing 390 hp (291 kW)
Performance: maximum road speed 90 km/h (56 mph); maximum range 800 km (500 miles); fording amphibious; gradient 60%; vertical obstacle 0.60 m (1 ft 11⅔ in); trench 1.90 m (6 ft 3 in)

ITALY

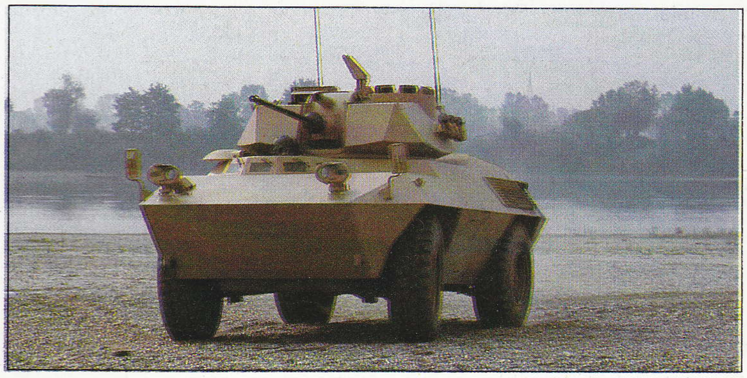
FIAT Type 6616 Armoured Car

During World War II the Italian army used scout cars and armoured cars on quite a large scale, but in the post-war period no vehicles of this type were developed as the Italian army did not have an operational requirement for a vehicle of this type. Then in the early 1970s FIAT and OTO-Melara developed the **Type 6616** armoured car and the **Type 6614** armoured personnel carrier. In both cases FIAT was responsible for the powerpack and automotive components, plus final assembly, while OTO-Melara supplied the armoured hull and turret. The first prototype of the Type 6616 was completed in 1972, and 50 vehicles were subsequently ordered by the Italian government for the Carabinieri. Since then sales have also been made to Peru, Somalia and several other undisclosed countries.

The hull of the Type 6616 is of all-welded steel construction with a uniform thickness of 8 mm (0.315 in), somewhat thin when compared with other vehicles in this class. The driver is seated at the front of the vehicle on the left, with vision blocks giving good vision to the front and sides. The two-man turret is in the centre of the vehicle, with the engine and transmission at the rear.

The Type 6616 is fully amphibious, being propelled in the water by its wheels at a speed of 5 km/h (3.1 mph); all the preparation that is required before entering the water is to switch on the bilge pumps and pressurize the submerged mechanical components. Unlike most other comparable vehicles, the Type 6616 requires no trim vane at the front of the hull.

The commander is seated on the left and gunner on the right of the turret, each man being provided with an adjustable seat, observation equipment and a single-piece hatch cover. The communications equipment is mounted in the turret bustle. The main armament comprises a West German Rheinmetall 20-mm Mk 20 Rh 202 cannon with an elevation of +35° and a depression of −5°; turret traverse is 360°. Turret control is electric, with traverse at a maximum of 40° per seond and weapon elevation at a maximum of 25° per second. A total of 400 rounds of 20-mm ammunition is carried, of which 250 are for ready use and 150 in reserve. A useful feature of the weapon, which is also installed in the West German 8×8 Luchs amphibious reconnaissance vehicle and the Marder MICV is that the empty cartridge cases are ejected outside the turret automatically, and therefore do not clutter up the crew compartment. A 7.62-mm machine-gun is mounted co-axial with the main armament, and 1,000 rounds are carried for this. Mounted on each side of the turret is a bank of three forward-firing electrically-operated smoke-dischargers.



The FIAT Type 6616 armoured car is a joint development between FIAT and OTO Melara, and shares many common components with the Type 6616 APC. It is, however, under-armed, and for this reason a model with a 90-mm (3.54-in) two-man turret has recently been built. This has the Belgian Cockerill gun used in many AFVs.

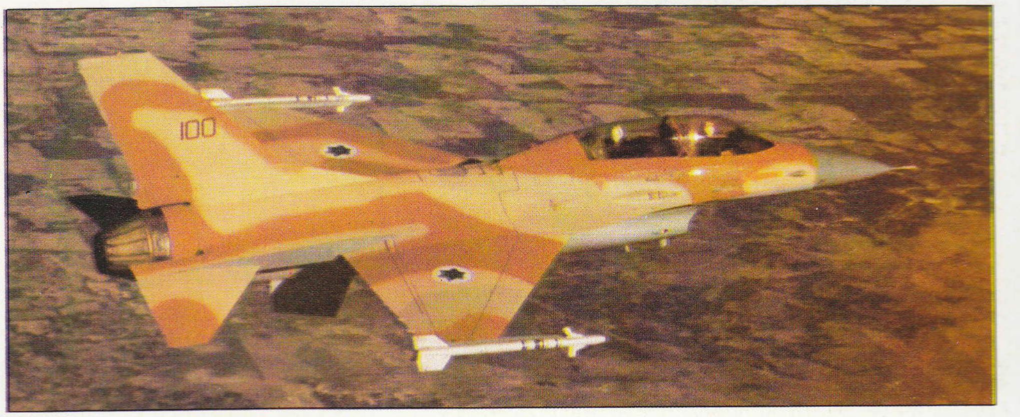
Standard equipment includes a front-mounted winch with a capacity of 4500 kg (9,921 lb), while optional equipment includes an NBC system, a full range of passive night-vision equipment for commander, gunner and driver, and a fire-extinguishing system.

One of the main drawbacks of this vehicle on the export market is its small-calibre gun. More recently FIAT has fitted the basic Type 6616 chassis with a new two-man OTO-Melara turret armed with a 90-mm (3.54-in) Cockerill Mk III gun and a co-axial 7.62-mm machine-gun, so giving the vehicle the capability to engage much heavier vehicles than in the past.

Specification

Crew: 3
Weight: 8 tonnes
Dimensions: length 5.37 m (17 ft 7½ in); width 2.50 m (8 ft 2½ in); height 2.035 m (6 ft 8 in)
Powerplant: one FIAT diesel developing 160 hp (119 kW)
Performance: maximum road speed 100 km/h (62 mph); maximum range 700 km (435 miles); fording amphibious; gradient 60%; vertical obstacle 0.45 m (1 ft 5¾ in); trench not applicable

Israeli Defence Force/Air Force



One of eight General Dynamics F-16B Fighting Falcon two-seat trainers supplied along with 67 F-16As in Israel's initial order for the type. Of 92 Syrian aircraft destroyed in the Lebanon war, the F-16A accounted for 44.

If practice makes perfect, then the Israeli Defence Force/Air Force (la Tsvah Hagana le Israel/Heyl ha'Avir) is an air arm without parallel. The modern state of Israel was born to the accompaniment of gunfire in 1948 and since that time has had to fight hard and often against hostile Arab neighbours for its very existence. The army and small navy have each played their parts, but it has been principally through the effective use of air power that Israel has survived.

Fighting spirit alone is insufficient to defeat a well-armed and numerically superior enemy, and Israel has therefore been fortunate in receiving considerable military aid from the United States with which to buy some of the most potent aircraft found in any air arm. A comparatively small country (the size of Wales if its annexed territories are discounted), Israel has a population of some four million, yet in 1984 will receive $1,700 million in US military assistance and $850 million in economic grants. Only half the former sum is to be repaid, technically at least, for with rampant inflation and a national debt of $28,000 million (and rising), Israel needs US dollars, as much as its weaponry, to remain in being.

Military supplies have flowed irregularly to Israel in recent years because of actions which have incurred US displeasure. Deliveries of an initial batch of General Dynamics F-16 Fighting Falcons were temporarily held up when aircraft of this type were involved in destruction of Iraq's nuclear reactor in 1981, and when Israel annexed the Golan Heights (seized from Syria in the 1967 war) later in the year a strategic co-operation treaty was cancelled.

In June 1982 Israel invaded the Lebanon (in the process shooting-down 85 Syrian aircraft in air combat for the loss of only two fighters and a helicopter to ground fire), again provoking a US embargo on purchase of more F-16s. As always, the US eventually relented, and the Falcon order was approved in 1983.

To the extent which financial constraints will permit, Israel is producing its own aircraft and weapons to arm the IDF/AF, self-sufficiency being a way of preventing a recurrence of the serious equipment problem in the late 1960s when France changed its allegiance from Israel to the Arab world and embargoed delivery of 50 urgently-needed Dassault Mirage 5Js. By far the most important local weapon is nuclear, an Israeli capability having been claimed in 1974 and subsequently verified by the CIA.

Combat aircraft production began for the IDF/AF in Israel with the IAI Nesher (an unlicensed copy of the Mirage 5), and when fitted with the US-supplied J79 engine this became the Kfir. The Kfir-C2 added canards to the air intakes for enhanced combat manoeuvrability, whilst production is now turning to the Kfir-C7 variant with more engine power, advanced nav/attack equipment and other new avionics.

IDF/AF weaponry includes the indigenous Shafrir air-to-air missile, which has been renamed Python in its Mk 3 form, and an air-launched version of the Gabriel anti-ship missile which will shortly enter service (mainly on the Phantom) although it can also be applied to the navy's IAI Sea Scan surveillance aircraft.

The most challenging venture for Israel Aircraft Industries has only recently begun, and is expected to result in delivery of the first of 300 or more Lavi strike-fighters to the IDF/AF in 1990, following the prototype's initial flight in November 1985. Relying heavily on bought-in US technology, including its single Pratt & Whitney PW1120 turbofan engine, the Lavi is an expensive and prestigious combat aircraft for Israel, its far-from-secure future depending on the availability of funds and continued good relations with the USA.

Air defence is a prime requirement for Israel, as indicated by the allocation of eight of the 19 combat squadrons to this task. Foremost interceptor is the McDonnell Douglas F-15 Eagle and its armoury of radar-guided Sparrow and IR-guided Sidewinder AAMs, the first of an initial 23 F-15As and two F-15B trainers entering service with No. 133 Squadron in December 1976. Fifteen more of the type arrived in 1981-2 to permit formation of a second unit, and a further 11 (probably F-15Cs) are on order.

More recently, in January 1980, Israel received the General Dynamics F-16 Fighting Falcon from a contract covering 75, including eight F-16B trainers. Ideally suited to the close 'dogfighting' battles which have taken place between the IDF/AF and Syrian air force, the Falcon currently equips three interceptor squadrons (including No. 117), whilst a similar number will convert with the follow-on batch of 75 F-16C/Ds due in 1986-8.

During the June 1982 fighting against Syria, F-16s shot down 44 Mikoyan-Gurevich MiG-21s and MiG-23s, and the F-15 accounted for 40 of the same, without Israeli loss in each case. Three squadrons of some 90 Kfir-C2s which complete the air defence force were apparently held in reserve and made no claims.

In the fighter-bomber role, the ubiquitous McDonnell Douglas F-4 Phantom continues to serve the IDF/AF well, some 120 (plus 11 RF-4E tactical reconnaissance variants) operating with five squadrons, partnered by one squadron of Kfir-C2s. Close support work is entrusted mainly to the McDonnell Douglas A-4 Skyhawk, of which there are 95 (including 20 two-seat trainers) flying with four squadrons, with a further 60 aircraft in storage. One Kfir-C2 squadron is also assigned to this role from some 170 in service, plus about 50 to be delivered before production ends in 1986.

Among the principal bases used by these front-line units are the recently completed airfields at Ovda and Ramon, in the Negev desert, built mostly with US funds as replacements for Eitam and Etzion which were in territory handed back to Egypt as part of the Camp David peace agreement between the two countries. Of modern design, these new bases include underground hangars for two squadrons, giving protection against air attack. Other combat bases include Hatzor, where there are two Phamtom and two Kfir-C2 units; Eqron with Phantoms and Skyhawks; Hatzerim; and Ben Gurion/Tel Aviv with Kfir-C2s.

To be continued

Of 30 CH-53D Stallions supplied to Israel, 25 remain in service as heavy assault transport helicopters with a high-density capacity of 55 fully-laden troops. Note the starboard nose-probe which provides an inflight refuelling capability.